MAY 13, 1961

Chemical Week

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Rare earths bank on purity to open new markets . . . . . p. 59

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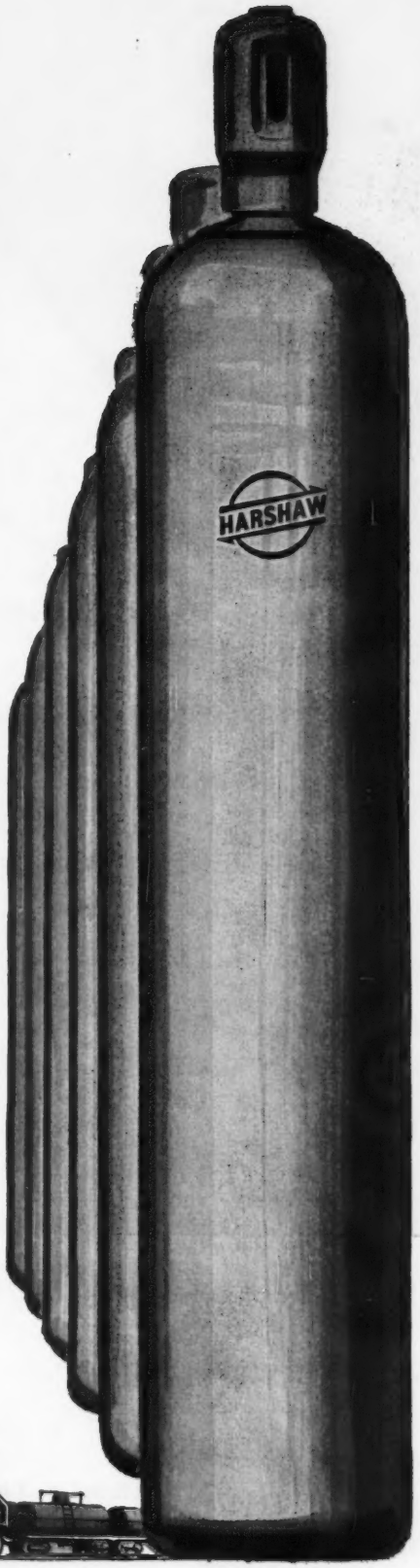

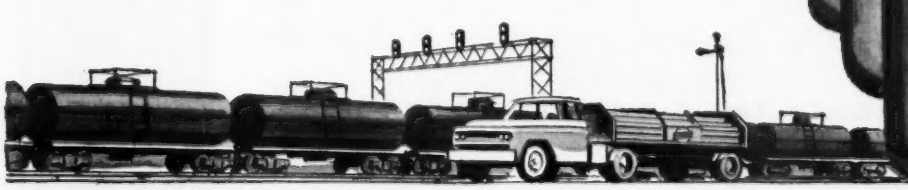

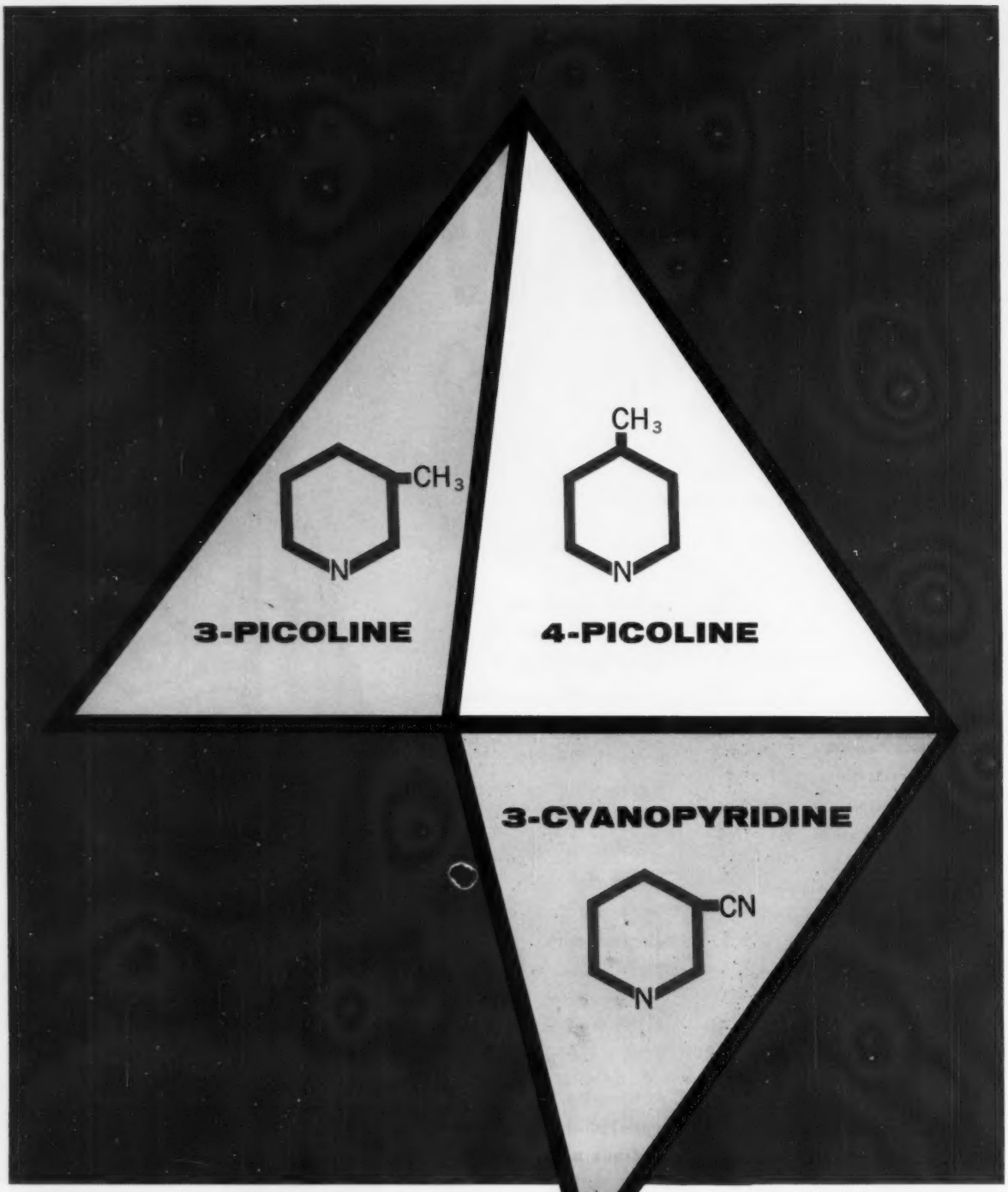

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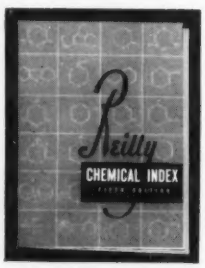

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ON THE COVER: Growing stack of aluminum ingots epitomizes quickening pace of aluminum production. It bodes well for action on aluminum industry's shelved capital projects (p. 25).

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What Price Federal Regulation?

EMOTIONAL—as opposed to rational—attitudes often becloud and distort issues.

A noteworthy example of such a situation involves House bill 1937, introduced by Rep. Martha Griffiths (D., Mich.), which is passed off by many as just another attempt by antivivisectionists to eliminate use of animals in medical experimentation.

The Griffiths bill is aimed at insuring "humane treatment of animals used in experiments and tests by recipients of grants" from the U.S. government by imposing on medical researchers strict controls under a government regulatory agency. Controls would include certificates of compliance, extensive project planning, proof of proper animal care, emphasis on use of anesthesia, keeping of complete records, filing of detailed annual reports, etc.

No stretch of imagination is required to see why medical research organizations envision hopeless entanglement in bureaucratic red tape and concomitant stifling of research progress.

It's important to observe, however, that the Griffiths bill is ostensibly *not* an antivivisection bill, although this point is often obscured in the heat of battle. The Griffiths bill, differing only slightly from the Cooper bill introduced last year, is patterned after existing British law and originates from proposals made in '55 by Mrs. Christine Stevens (wife of Roger Stevens, former chairman of the finance committee of the Democratic National Committee).

The National Society for Medical Research—which represents a host of member organizations, including many pharmaceutical firms—obviously considers Mrs. Stevens a formidable foe. Politically astute, she wields considerable power as president of the Animal Welfare Institute (officially not antivivisectionist) and as secretary-treasurer of a lobbying organization, the Society for Animal Protective Legislation.

For years NSMR and AWI, through their respective publications, have bombarded each other with bitter arguments and insinuations of bad faith. This, as we see it from the sidelines, is the crux of the problem.

Because the outcome of the battle can have extensive repercussions, their differences should not be settled through political maneuvering nor through resort to obvious propaganda devices (e.g., selective citations of British authorities on alleged success or failure of British medical research under similar law).

Oddly, the two organizations are not poles apart, as would appear likely. NSMR once said as much, while at the same time taking AWI to task about its editorial practices. Said NSMR: "As far as official statements of policy are concerned, the two organizations seem to be in near agreement. Both believe in the need for animal experimentation and both stand for constant improvement of the care of laboratory animals. But we keep getting the feeling that there is something more to the purpose of AWI than is expressed in the prospectus. Otherwise we would not be catching the AWI with knife in hand so often."

There's no doubt that this controversy is important, and *CW* urges those firms in the CPI who are directly or indirectly involved in the issue to participate actively and constructively toward a rational solution.

Handled in haste, the issue could do great harm to vital medical research.

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LETTERS

Asian Engineers

TO THE EDITOR: I have read your article "European Engineering: Your Problem Now" (*Dec. 10, '60, p. 57*). Previously you have published several articles on the possible shortage of chemical engineering graduates. . . .

I was wondering if there has been any suggestion about the possibility of temporarily tapping engineers from Asian countries who are graduates of U.S. schools and are now employed in the chemical industries. Even local-school graduates with several years' experience in an industry might be willing to work on a contract basis for a period of time with the permission of their present employers. This arrangement will be beneficial to both employer and employee, considering the added experience gained. Generally, the different companies here in the Philippines, for example, have many engineers to spare. . . .

Maybe a setup similar to that for foreign doctors can be established wherein the foreign engineers will be allowed to work for several years in the U.S.

A survey could be conducted to establish the quality or type of engineers that can be utilized for this kind of work. . . .

CESAR V. CAMPOS
Toledo City
Philippine Islands

Permanence, Not Speed

TO THE EDITOR: Re your report (*March 25, p. 111*) on depreciation.

First, I wish to commend you and your associates for selecting this topic for study. Not only is it timely because of President Kennedy's recommendation for liberalization of depreciation allowances as a stimulus to business spending on plant and equipment, but also it is a particularly appropriate subject for CHEMICAL WEEK in view of the capital intensive nature of the chemical processing industry.

In '60, all manufacturing corporations (except newspapers) had, in the aggregate, less than 3¢ invested in plant, property and equipment (after deducting reserves for depreciation and depletion) for every dollar of sales realized, while chemicals and allied products manufacturers had over 36¢, 12 times as much, tied up for every dollar of sales, according to data of the Federal Trade Commission.

Moreover, owing to the rapid obsolescence of products and processes in the chemical industry, the ratio of economic life to physical life of plant and equipment is relatively low. Thus it appears that the industry is doubly penalized by present restrictions imposed on depreciation deductions, a factor that must hamper expansion, modernization and productivity. The case for liberalization is therefore well illustrated by the situation in which the chemical process industry finds itself.

While, in my opinion, good reasons have long existed for liberalizing the depreciation allowance (beyond that accomplished in '54), I have some doubt whether such action should be undertaken simply as a temporary expedient to stimulate the economy. It is questionable, first, whether any such stimulus is needed to turn the tide; second, whether it would be effective in doing so; third, whether an equitable "quickie" formula can be devised; fourth, whether its strength might precipitate the economy into further overbuilding of capacity; and fifth, whether the Treasury should risk even a temporary loss of revenue. Finally, I question whether we know enough about the impact of such complex provisions of the tax law to warrant our tinkering with them as a tool of countercyclical policy.

I should be inclined, instead, to delay making modifications in the depreciation provisions until it could be done as a permanent feature of a broad and badly needed reform of the entire tax structure, with sights on the long-range effect, rather than on the short-range boost to the economy. At such time, I would favor giving careful consideration to abolishing the historical approach to depreciation rates in favor of one or more clearly recognizing economic, as distinguished from physical, life.

RALPH E. BURGESS
Ralph E. Burgess & Associates
Wilton, Conn.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

Nonlinear Programing

TO THE EDITOR: I have read your article "Trading 'Guesstimates' for Facts" (*Feb. 25, p. 67*). It cites F. E. Satterthwaite as "the inventor of the new method . . . convex programing," which I take to be identical with nonlinear programing in the nonconcave case.

I am sure you do not want to imply that Mr. Satterthwaite is the first one to have worked with such nonlinear problems or the first to have developed a usable method of computation. Work in the area goes back to the early 1950s and involves such names as Harry Markowitz, Alan Manne, Philip Wolfe, Abraham Charnes, W. W. Cooper, Harold Kuhn, A. W. Tucker and many others. Moreover, a number of new nonlinear computational methods have recently become available; particularly, Rosen's gradient projection method appears to be extremely promising.

WILLIAM J. BAUMOL
Department of Economics
Princeton University
Princeton, N.J.

Crab Grass Control

TO THE EDITOR: May I compliment CHEMICAL WEEK on the article (*April 1, p. 63*) concerning crab grass control. The article presents a positive view, shows the intensity of research being done by the industries, and gives credit to those who are active and vigorously pursuing a real problem for a large segment of our population.

WILLIAM H. DANIEL
Midwest Regional Turf Foundation
Dept. of Agronomy
Purdue University
Lafayette, Ind.

TO THE EDITOR: . . . I think you have done a . . . good job of summarizing the crab grass control situation, and I congratulate you for it. . . .

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In regard to the calcium propyl arsonate, to some of us the big feature is the sudden marketing of this material with extremely limited field research, particularly when compared with the Dow product. . . .

Your article also suggests the low rate of application of the arsonate as a selling point. . . . From a performance standpoint, however, one should consider that a uniform application is much easier to make with the larger amount of material. Uniformity is extremely important with this type of chemical. . . .

Most of us agree wholeheartedly with the unnamed USDA official quoted at the end of the article; but . . . materials are on the market and will be bought and used by many homeowners this year. . . .

JOHN R. HAVIS
Head, Waltham Field Station
Commonwealth of Massachusetts
University of Massachusetts
Agricultural Experiment Station
Waltham, Mass.

Alkyl Silanes

TO THE EDITOR: May I correct an error in your report of the highlights of the 139th ACS national meeting (*CW Technology Newsletter, April 1, p. 43*)? The direct route to alkyl silanes from silica described by R. C. Anderson at this meeting did not originate with Dow Corning. It was discovered in the research department of Nobel Division, Imperial Chemical Industries Ltd., and has been extensively investigated there. This important development in silicon chemistry is the subject of patent applications.

T. BROADHURST
Imperial Chemical Industries
(New York), Ltd.
New York

Uranium Price

TO THE EDITOR: May I draw your attention to an article (*April 15, p. 43*) citing the new contract signed by Trace Elements Corp., a subsidiary of Union Carbide Corp., with the Atomic Energy Commission. The price per pound for uranium in the post-April 1, '62, period will be $8, not the $3 mentioned.

G. F. MCCUE
Union Carbide Nuclear Co.
New York

MEETINGS

Chemical Specialties Manufacturers Assn., 47th midyear meeting, Drake Hotel, Chicago, May 14-17.

Conference, "Water Pollution in the Great Lakes Area"; sponsor: DePaul University; Pick-Congress Hotel, Chicago, May 15-16.

Assn. of American Battery Manufacturers, Inc., spring meeting, Roosevelt Hotel, New Orleans, May 15-17.

Chemical Market Research Assn., 21st annual meeting, Plaza Hotel, New York, May 17-18.

Western Petroleum Refiners Assn., mid continent regional meeting, Lassen Hotel, Wichita, Kan., May 17-19.

Metallurgical Society of American Institute of Mining, Metallurgical and Petroleum Engineers, first conference on "Management of Materials Research," Arden House, Harriman, N.Y., May 17-19.

Glass Container Manufacturers Institute, Inc., spring meeting, The Greenbrier, White Sulphur Springs, W. Va., May 23-25.

Sea Horse Institute, 1961 meeting, Crest Theatre, Wrightsville Beach, N.C., May 23-26.

International Water Supply Assn., fifth congress, Congress Hall, West Berlin, Germany, May 23-June 1.

Commercial Chemical Development Assn., spring meeting, Bedford Springs Hotel, Bedford, Pa., May 24-25.

Western Petroleum Refiners Assn., computer conference, The Benjamin Franklin Hotel, Philadelphia, May 24-26.

Pacific Northwest Society for Paint Technology, annual symposium, Georgia Hotel, Vancouver, B.C., Can., May 26-27.

American Institute of Chemical Engineers, sixth technical conference, McNeese College, Lake Charles, La., June 1.

Society of the Plastics Industry, Inc., national plastics conference, New York Coliseum, New York, June 5-9.

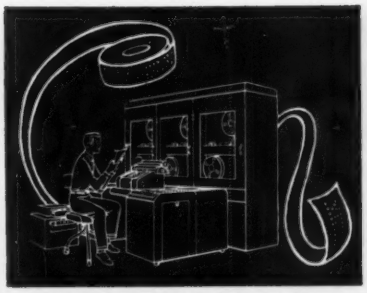
National Congress on Environmental Health, University of Michigan School of Public Health, Ann Arbor, June 6-8.

13th International Chemical Engineering Exposition and Congress, Frankfort, Germany, June 9-17.

Air Pollution Control Assn., 54th annual meeting, Hotel Commodore, New York, June 11-15.

Instrument Society of America, third international symposium on gas chromatography, Michigan State University, East Lansing, June 13-16.

American Society for Testing Materials, 64th annual meeting, Chalfonte-Haddon Hall, Atlantic City, June 26.



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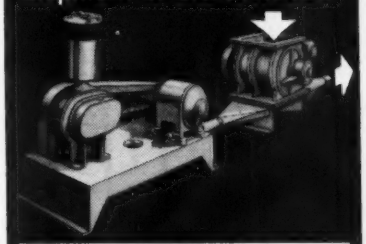

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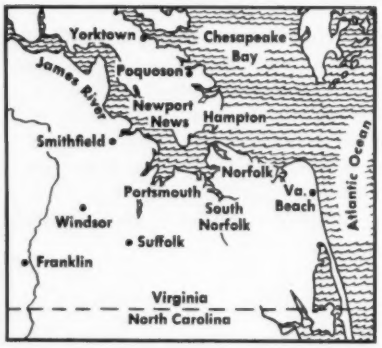

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Celanese CL-202 gives you excellent tint retention and durability in exterior water-based paint formulations—as proved in actual outdoor exposures of up to six years. • Low cost, high PVC paints formulated with CL-202 are ideal for a wide variety of exterior surfaces—including previously painted wood, asbestos shingles, and masonry surfaces such as cement, stucco, brick and concrete. • Moreover, paints formulated with CL-202 can accept most of the universal color systems commercially available. (Specific suggested formulations for each color system are available from the Celanese Technical Service Laboratory.) • For complete details on Celanese CL-202 . . . or other Celanese emulsions . . . please write to: Dept. 552-E, Celanese Chemical Company, 180 Madison Avenue, New York 16, N. Y.

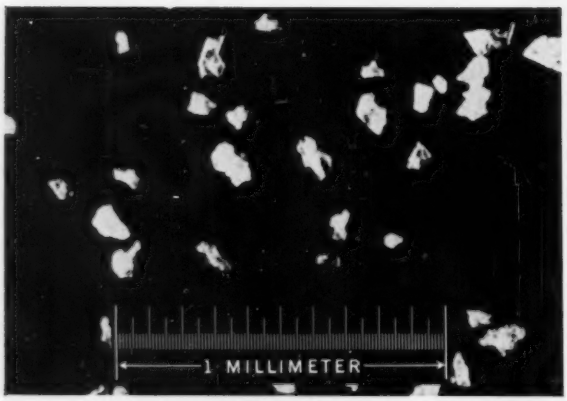
Celanese®

Celanese CHEMICALS

Celanese Chemical Company is a Division of Celanese Corporation of America.
Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.

Get Sodium Bicarbonate in the grain size you need every time...

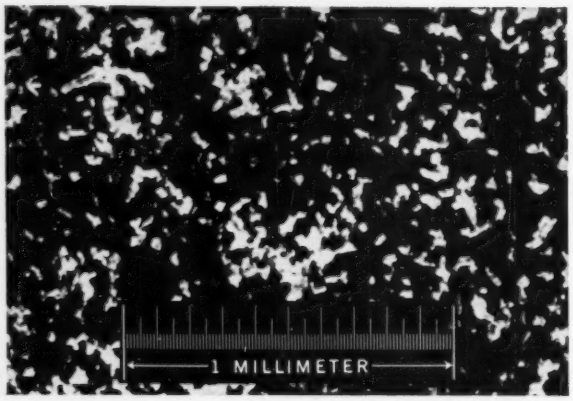
FROM CHURCH & DWIGHT



Sodium Bicarbonate U.S.P. Powdered No. 1—For general purpose use in chemical processing, dyestuffs, adhesives, starches, textiles and industrial applications.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

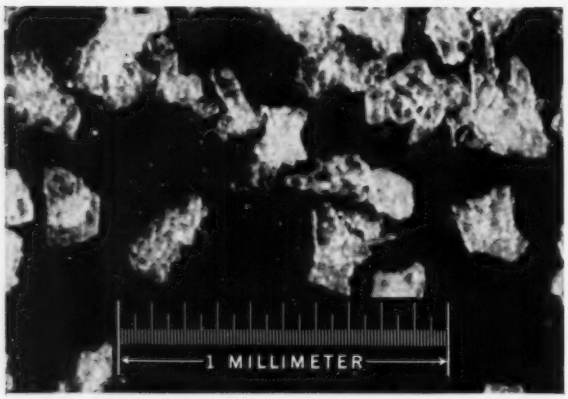
42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%



Sodium Bicarbonate U.S.P. Fine Powdered No. 3DF for use specifically in dry powder fire extinguisher mixes, also in rubber and plastics blowing, lubricant for sheet vinyl.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

170 Mesh	Trace	325 Mesh	25.0%
200 Mesh	2.0%	400 Mesh	45.0%



Sodium Bicarbonate U.S.P. Granular No. 5 for use in effervescent salts, other pharmaceuticals and special types of cleansers.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	100 Mesh	92.5%
65 Mesh	27.0%	170 Mesh	99.0%
80 Mesh	66.5%		

Sodium Bicarbonate U.S.P. Treated Free-Flowing for use in fire extinguishers and sponge rubber.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%

Are you getting Sodium Bicarbonate of the specific grain size for optimum results in your process or for maximum shelf life and performance of your products? You can eliminate doubts by specifying Church & Dwight. This simple step will assure you of obtaining the widest selection of grain sizes available because Church & Dwight is the country's largest supplier of Sodium Bicarbonate U.S.P. You'll also receive for the asking unmatched technical service based on more than 100 years of experience with Sodium Bicarbonate. Unusual grain size requirements are given special attention. Try us and see. For technical data on all grades of Sodium Bicarbonate, send for brochure, "Church & Dwight Sodium Bicarbonate—How It Serves Industry Today."

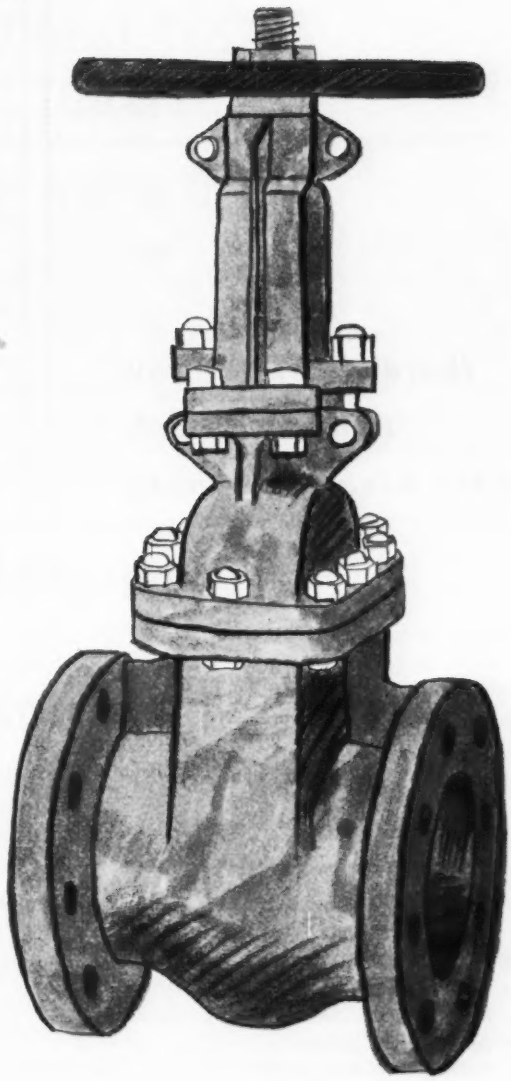
CHURCH & DWIGHT CO., INC., 70 PINE STREET, NEW YORK 5, N. Y.

Why are the biggest equipment and raw materials suppliers to the Chemical Process Industries the largest advertisers in the BUYERS' GUIDE ISSUE of Chemical Week? These are the companies with the strongest sales staffs and ad programs. Wouldn't you figure they'd be the first to say, *"So who needs it?"*

And since, generally, they're as big as they are because they're as smart as they are . . . isn't it worth your while to look for the reason? Could it be they've discovered the GUIDE — in its own homely way — does things no sales force or straight business-paper advertising can do as well at such equitable cost? No, not even the regular issues of Chemical Week.

That's right! It's just as satisfyingly simple as that. But unless you, yourself, have advertised your products here, you'll never know how versatile *(and profitable)* plain, old-fashioned utility can be. It's as fundamental as a telephone book for locating the right number . . . or the Farmer's Almanac for checking the weather. Day-by-day, hour-by-hour . . . it describes, details, explains, reminds, confirms — provides full source of supply and product information for 48,000 management subscribers to Chemical Week.

If it does so much for your customers and prospects, why not consider what it can do for you?



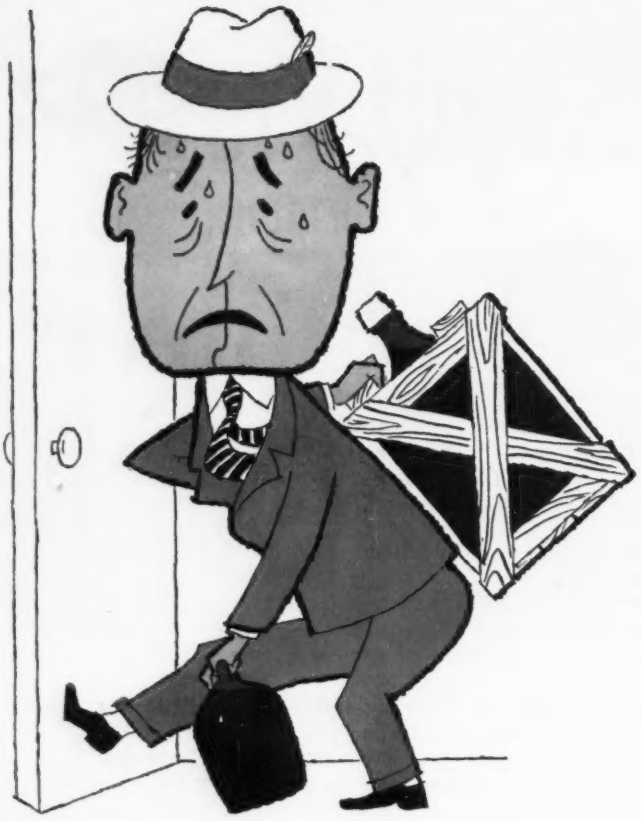
Chemical Week Buyers' Guide Issue

Published . . .

September 30

Closing . . . June 15, 1961

there's a better way
to make a buck
in the bleach business



now . . . investigate

CDB® CHLORINATED DRY BLEACH

for bigger profits, easier selling!

ADVANTAGES OF CDB-BASED DRY BLEACH PRODUCTS

- True chlorine bleaching equal to liquid hypochlorites!
- Safe for fabrics! Minimize tendering, never cause pin-holing.
- Easy to measure and use! Eliminate pre-diluting and pre-dissolving.
- Mistake-proof! Over-use can't cause damage.
- Compact to store! Eliminate breakage, spillage.
- Calcium-free! No hard-water soap-specking. Soaps fully utilized.

If you're trying to keep your toe in the door in the highly competitive, thin-margin hypochlorite business . . .

Or, finding it tough to sell a dry bleach that is less than fully effective, difficult to use, causes pin-holing . . .

Then it's high time you looked into the new opportunities CDB *Chlorinated* Dry Bleach offers you. Even if you are not now making any bleach product, there are excellent profit potentials for you right now in selling commercial laundries, coin-op installations and home-laundry bleach.

FMC has a full-time staff of specialists ready to work with you to help you capitalize your opportunities in this growing business. We'd like to discuss the market potentials with you, tell you how we can help you with vital selling facts, and suggest starting-formulations for some interesting new products. Call or write for prompt action!

mixed shipments with FMC® PHOSPHATES

For extra profits you can save by combining CDB's in mixed truckloads with any of our comprehensive range of sodium and potassium phosphates.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
Mineral Products Division

General Sales Offices:
161 E. 42nd STREET, NEW YORK 17

EXTENSIBLE CLUPAK® PAPER*

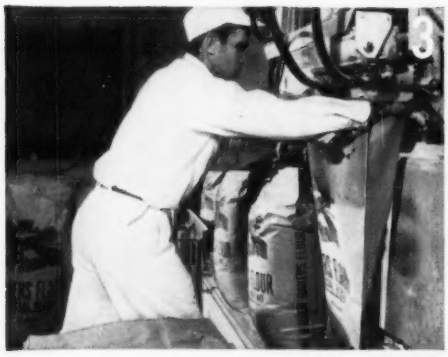
MULTIWALL BAGS OUT-PERFORM CONVENTIONAL KRAFT IN THE 3 TOUGHEST TESTS IN PACKAGING TODAY!

1 In Handling And In Transit!

Multiwall and baler bags made of new CLUPAK extensible paper withstand the strain and impact that produce costly breakage in conventional bags. This increased toughness allows multiwall and baler bag users to increase package strength yet decrease the number of plys with resulting economies. The next time you order, say CLUPAK before you say paper and see how it out-performs your present packaging material.

2 In The Warehouse!

Stack them high! Multiwalls and baler bags made of CLUPAK extensible paper hold greater loads, take greater strains, stack compactly and safely even with lower basis weight paper. The stretch and "give" built into CLUPAK extensible paper lets it "ride" with punches that often open holes in conventional kraft. Bags with the trademark CLUPAK warehouse faster—without "kid glove" treatment.



3 On The Filling Line!

Here, where multiwalls get their first and often most rigorous test, particularly on high speed filling and packaging equipment, CLUPAK extensible paper multiwalls are unexcelled! Their high energy absorption reduces breakage, helps maintain uninterrupted production schedules, cuts product waste and repackaging costs. Plan a trial shipment of multiwalls made of CLUPAK extensible paper!

Prior to CLUPAK extensible paper, there were no controlled standards of toughness in the paper industry. Clupak, Inc., is proud to have established these standards and permits the use of its trademark only on paper which meets these rigid toughness requirements.

EXTENSIBLE CLUPAK® PAPER

Ask your salesman about this revolutionary new material... prove to yourself that multiwall bags made of CLUPAK extensible paper give you...

GREATER STRENGTH WITH LOWER TOTAL BASIS WEIGHT

*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N.Y. 36, N.Y.

NOW... a new surfactant molecule to give you the balanced best of two outstanding surfactant classes

The new Stepan Amidox series offers excellent potential for use in detergents, shampoos, emulsions and other systems. Consisting of a series of ethoxylated alkylolamides, this whole new group of surfactants combines the advantageous characteristics of *both* alkylolamides and phenol polyglycol ether nonionics. The series ranges from a predominantly alkylolamide character to a predominantly nonionic character as increasing amounts of ethylene oxide are added to the amide. Thus, in varying degrees the foam boosting, viscosity building properties and the relative mildness of the alkylolamide is combined with the superior solubility in hard water and alkaline stability of the nonionics.

The Amidox L series are ethylene oxide condensates of lauric monoethanolamides. The Amidox C series are ethoxylated coconut fatty acid monoethanolamines.

Write for complete information

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Business
Newsletter

CHEMICAL WEEK
May 13, 1961

Are U.S. rayon staple fiber producers being hurt by lower-priced imports? The U.S. Tariff Commission will have the answer concerning imports from France, Belgium, West Germany and, of all places, Cuba, sometime before the end of next week.

The Tariff Commission has been holding hearings on the cases, which were brought under the Antidumping Act after the Treasury Dept. found that the fiber was coming in from the source countries at less than fair value.

•

Amid talk of polypropylene overcapacity and coming price cuts, W. R. Grace is taking the cautious way into the market. Under terms of a just-signed agreement Grace will share with Chemore Corp. (Montecatini's U.S. representative) the marketing of polypropylene produced by the plant due onstream the third quarter of this year at Neal, W.Va. (to be operated by Montecatnin subsidiary Novamont). Grace will get another plastic—without a capital gamble. Novamont will get an experienced plastic marketer.

•

How to make money in plastics. A just-out report by Puerto Rico's Economic Development Administration says that plastic products manufacturers there average 12.8¢ point on each sales dollar, compared with 3¢ to a dollar for similar operations on the mainland.

The number of plastic products makers on the island now totals 51, and according to the report integration of industry has made many raw materials available (e.g., molding compounds, styrene, vinyl resins) at prices comparable to mainland quotes.

•

Here's more on American Cyanamid's new Wasco acquisition (*CW Business Newsletter, April 8*). Terms of the purchase agreement include the exchange of approximately 40,000 shares of Cyanamid stock for substantially the entire business and assets of Wasco, including the stock of the latter's six subsidiaries.

Cyanamid, says new Board Chairman Wilbur Malcolm, will operate Wasco as a department of the company, with Max Wasserman (founder and president of the 26-year-old plastics firm) remaining as operating head of the new Wasco products department.

•

Evidence of a brightening outlook for chemical sales continues to pile up (*see also Market Newsletter p. 96*).

In San Francisco last week Standard Oil's (California) Board Chairman R. G. Follis told stockholders that "chemicals are leading the

company's upward trend." Sales this year, he said, are expected to increase "greatly" from last year's $156 million level.

Follis also revealed that Stancal will invest more than $50 million in chemical projects this year.

"Best first quarter ever" sums up the picture of total sales and net income of Food Machinery and Chemical. The details, according to Chairman Paul L. Davies: sales in the three months ended March 31 were nearly $91.5 million—up 19% from a year ago; net income (over $4.45 million) showed at 14% increase over the nearly $3.9 million of the comparable '60 period.

•

Another step forward for high-temperature-resistant fibers, particularly for Du Pont's HT-1 polyamide: The company is building a pilot plant—slated for completion late in '62—at Richmond, Va. Although Du Pont officials are still mum on composition of the fiber (*CW, April 15, p. 91*). and production plans, the new unit will probably turn out about 1 million lbs./year of HT-1.

Du Pont autiously declares that the material "shows great promise" in industrial uses, and that application in various military uses "is also being explored." Air Force officials, however, report that the material has prospective use in supersonic aircraft tires, military clothing, personnel parachutes, and pack and decelerator parachutes for space capsules. The product, reportedly able to withstand temperatures as high as 840 F (nylon melts at 482 F), will also undergo AF tests to determine suitability for ablating plastics, for re-entry heat shields, and other hyperthermal applications.

•

Action to block further use of maleic hydrazide (MH-30) is very much in doubt. The Senate Agriculture Committee might seek legislation to ban use on tobacco; the similar House committee may not take such action, despite recent USDA reports (*see also p. 28*).

•

A new high for British Pharmaceutical exports was hit in '60. Reports from London show exports of drugs and medicines reached a record $124.18 million, nearly $9.8 million higher than in '59. Exports to Common Market countries rose from $7.56 million to $9.52 million. Best customer was Australia, which took $11.2 million worth; Nigeria was next in importance with purchases of $7.84 million, and Pakistan, about $6.72 million.

•

And England's Imperial Chemical Industries has completed negotiations for the purchase of the firm Hollandsche Gummifabrieken Weesp, a Dutch manufacturer of plastic sheet and film and PVC-coated fabrics. The deal, believed to involve more than $1.4 million, is subject to approval of the British Treasury and the Netherlands Bank.

Among the important factors in Shell Chemical's decision to make polystyrene were its extensive background in polymers and its raw material position. Two other Shell thermoplastics followed quickly—polypropylene and polyethylene.

BULLETIN:

On May 3, 1960, a remarkable thermoplastics decision was made by Shell Chemical

Read about this Shell decision. And how you can start benefiting today from a major new source of polystyrene, polypropylene and polyethylene that resulted from it.

ON MAY 3, 1960, Shell Chemical, a company long basic in styrene monomer and SBR rubber, decided to combine the two in full commercial production of Shell high impact polystyrene. Why was this remarkable?

A revealing fact on polystyrene

The condition of the polystyrene market was not attractive. There was oversupply from some of America's finest companies. The field was mature and Shell was starting late.

One revealing fact offset this situation. *Shell, with its excellent background in polymer chemistry—as exemplified by Shell Isoprene Rubber, the industry's first commercially produced synthetic/natural rubber—could make positive contributions to the thermoplastics field in the form of new products.* But Shell would be severely handicapped without a thorough understanding of how the thermoplastics market works and what it wants.

Result? Shell's decision to go full speed ahead with high quality general purpose, medium and high impact Shell polystyrenes, plus a rapidly expanding technical sales force.

80 million pounds of polypropylene

Two other thermoplastic developments followed quickly.

One, Shell's announcement in October, 1960, for an 80 million pounds a year polypropylene plant with customer service and research facilities to be built near Woodbury, N. J. Two, an arrangement by which Shell will resell limited quantities of polypropylene until this plant comes on stream.

Custom-made polyethylene

And this, in turn, led to a third important thermoplastic.

In order to round out a complete line of thermoplastics, Shell Chemical, in January, 1961, made arrangements to supply the industry with the highest quality custom-made polyethylenes.

How to start benefiting

Thus, within 8 months, Shell became an important factor in three plastics: Shell polystyrene, Shell polypropylene and Shell polyethylene.

The next 8 months should be even more important. Shell will be going full speed ahead searching for new polymers you want.

Now is the time to let Shell's technical representative know your needs. Tell him about them on his next visit or write Shell Chemical directly at:

42-76 Main St., Flushing 55, N.Y. FLushing 3-4200; 20575 Center Ridge Rd., Cleveland 16, O. EDison 3-1400; 6054 West Touhy Ave., Chicago 48, Ill. SPring 4-6711; or 10642 Downey Ave., Downey, Calif. SPruce 3-0601.

A Bulletin from

Shell Chemical Company

SHELL

Plastics and Resins Division

24

CHLORINATED TOLUENE DERIVATIVES

FOR A NEW STIMULUS TO RESEARCH IMAGINATION

Whet your research imagination by glancing over the 24 structures here!

For your work in organic synthesis, you will find this chart a useful, intriguing guide. Some of these intermediate chemicals have been employed for decades in the preparation of dyestuffs and other organic chemicals. But newer uses are developing with research –

- in the compounding of tranquilizers and antihistamines . . .
- in agricultural chemicals . . .
- as peroxide catalysts for polymerization reactions . . .
- as special solvents . . .
- in the preparation of quaternary ammonium compounds . . .
- as dye carriers . . .

and as intermediates in a wide range of other applications.

Your source for quality chlorotoluene derivatives – Heyden Chemical Division! Greatly expanded facilities at Fords, N. J., insure the service you have come to associate with Heyden.

MOLECULAR WEIGHT: 140.57

Colorless to slightly yellow liquid which solidifies below 45°F. *Assay:* 97.0% minimum. *Congealing Point:* 7.0°C minimum. *Acidity* as o-Chlorobenzoic Acid: 1.0% maximum.

Uses: Pharmaceuticals. Triphenylmethane dyes. Other organic chemicals.

MOLECULAR WEIGHT: 140.57

Colorless to slightly yellow crystalline solid. *Assay:* 93.0% minimum. *Congealing Point:* 44.0°C minimum.

Uses: Preparation of triphenylmethane and related dyes, preparation of pharmaceuticals. Synthesis of various organic chemicals.

MOLECULAR WEIGHT: 156.57

White to slightly yellow crystalline powder. *Assay:* 98.0% minimum. *Ash:* 0.2% maximum. *Congealing Point:* 138.5°C minimum.

Uses: Preparation of pharmaceuticals, dyestuffs, preservatives, agricultural chemicals, and other organic chemicals.

MOLECULAR WEIGHT: 156.57

Coarse off-white powder. *Assay:* 96.0% minimum. *Ash:* 0.2% maximum. *Melting Point*, completely melted: 234.0°C minimum.

Uses: Preparation of pharmaceuticals, dyestuffs, preservatives, agricultural chemicals, and other organic chemicals.

MOLECULAR WEIGHT: 229.94

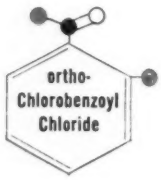
Colorless to slightly yellowish low-melting solid. *Congealing Point:* 27°C minimum.

Uses: For the manufacture of pharmaceuticals, dyestuffs, and other organic chemicals.

MOLECULAR WEIGHT: 229.94

Colorless to slightly yellowish liquid which solidifies below 40°F. *Congealing Point:* 3.0°C minimum.

Uses: For the manufacture of pharmaceuticals, dyestuffs, and other organic chemicals.



MOLECULAR WEIGHT: 175.02

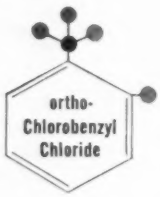
Colorless to slightly yellowish liquid. *Specific Gravity*, 25°/25°C: 1.377 minimum. *Congealing Point:* Minus 6.5°C minimum.

Uses: Synthesis of dyestuffs, pharmaceuticals, insecticides, and peroxide catalysts for polymerization reactions.

MOLECULAR WEIGHT: 175.02

Colorless to slightly yellowish liquid which solidifies below 50°F. *Specific Gravity*, 25°/25°C: 1.362 minimum. *Congealing Point:* 10.0°C minimum.

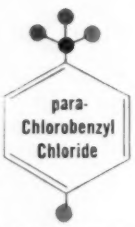
Uses: Synthesis of dyestuffs, pharmaceuticals, insecticides, and peroxide catalysts for polymerization reactions.



MOLECULAR WEIGHT: 161.04

Colorless to pale yellow liquid. *Specific Gravity*, 25°/25°C: 1.272 minimum, 1.287 maximum. *Distilling Range, Drop:* 213°C minimum, *Dry:* 225°C maximum.

Uses: For synthesis of organic chemicals and preparation of quaternary ammonium compounds.



MOLECULAR WEIGHT: 161.04

Colorless to slightly yellowish low-melting solid. *Specific Gravity*, 25°/25°C: 1.259 minimum, 1.269 maximum. *Congealing Point:* 25.0°C minimum.

Uses: For synthesis of pharmaceuticals, preparation of quaternary ammonium compounds, and other organic chemicals.

MOLECULAR WEIGHT: 126.59

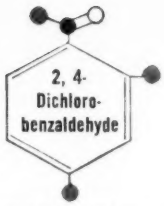
Clear, practically colorless liquid. *Specific Gravity*, 25°/25°C: 1.078 min. – 1.082 max. *Side Chain Chlorine:* None.

Uses: An intermediate for the manufacture of dyestuffs, pharmaceuticals, rubber chemicals, and other organic chemicals. A "carrier" in the dyeing of synthetic fibers. A special solvent.

MOLECULAR WEIGHT: 126.59

Clear, practically colorless liquid which solidifies below 45°F. *Specific Gravity*, 25°/25°C: 1.067 min., 1.069 max. *Congealing Point:* 6.5°C min. *Side Chain Chlorine:* None.

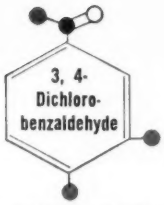
Uses: An intermediate for the manufacture of dyestuffs, pharmaceuticals, rubber chemicals, and other organic chemicals. A "carrier" in the dyeing of synthetic fibers. A special solvent.



MOLECULAR WEIGHT: 175.02

White to pale yellow crystalline solid. *Congealing Point:* 65.0°C minimum.

Uses: For synthesis of pharmaceuticals, dyestuffs, and other organic chemicals.



MOLECULAR WEIGHT: 175.02

White to pale yellow crystalline solid. *Congealing Point:* 37.0°C minimum.

Uses: For synthesis of pharmaceuticals, dyestuffs, and other organic chemicals.

MOLECULAR WEIGHT: 191.02

White to yellowish powder. *Congealing Point:* 158.0°C minimum. *Ash:* 0.2% maximum. *Assay:* 97.0% minimum.

Uses: For preparation of dyestuffs, pharmaceuticals, and other organic chemicals.

MOLECULAR WEIGHT: 191.02

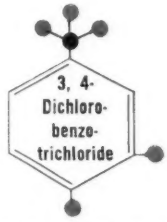
White to yellowish powder. *Congealing Point:* 202°C minimum. *Ash:* 0.2% maximum. *Assay:* 97.0% minimum.

Uses: For preparation of dyestuffs, pharmaceuticals, and other organic chemicals.

MOLECULAR WEIGHT: 264.39

Colorless to pale yellow crystalline solid. *Congealing Point:* 45.0°C minimum.

Uses: For synthesis of pharmaceuticals, dyestuffs, and other organic chemicals.



MOLECULAR WEIGHT: 264.39

Colorless to pale yellow liquid which solidifies below 75°F. *Congealing Point:* 23.0°C minimum.

Uses: For synthesis of pharmaceuticals, dyestuffs, and other organic chemicals.

MOLECULAR WEIGHT: 209.47

Clear, colorless to pale yellow liquid which solidifies below 65°F. *Specific Gravity*, 25°/25°C: 1.488 minimum, 1.503 maximum. *Congealing Point:* 16.0°C minimum.

Uses: For synthesis of pharmaceuticals, dyestuffs, peroxide catalysts, and other organic chemicals.

MOLECULAR WEIGHT: 209.47

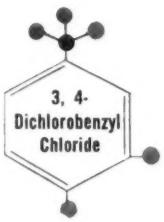
Colorless to slightly yellowish liquid which solidifies below 75°F. *Specific Gravity*, 25°/25°C: 1.503 minimum, 1.518 maximum. *Congealing Point:* 23.0°C minimum.

Uses: For synthesis of pharmaceuticals, dyestuffs, insecticides, and other organic chemicals.

MOLECULAR WEIGHT: 195.49

Clear, colorless to pale yellow liquid. *Specific Gravity*, 25°/25°C: 1.408 minimum, 1.418 maximum. *Congealing Point:* Minus 6.5°C minimum.

Uses: An intermediate for quaternary ammonium compounds, pharmaceuticals, and other organic chemicals.



MOLECULAR WEIGHT: 195.49

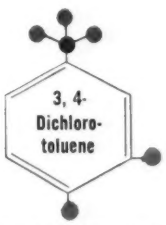
Clear, colorless to pale yellow liquid which solidifies below 35°F. *Specific Gravity*, 25°/25°C: 1.412 minimum, 1.416 maximum. *Congealing Point:* 1.5°C minimum.

Uses: An intermediate for quaternary ammonium compounds, pharmaceuticals, and other organic chemicals.

MOLECULAR WEIGHT: 161.04

Colorless to pale yellow liquid. *Specific Gravity*, 25°/25°C: 1.247 min., 1.251 max. *Distilling Range:* 199°-202°C. *Side Chain Chlorine:* None.

Uses: For the preparation of dyestuffs, pharmaceuticals, rubber chemicals, and other organic chemicals. A "carrier" in the dyeing of synthetic fibers. A special solvent.



MOLECULAR WEIGHT: 161.04

Colorless to pale yellow liquid. *Specific Gravity*, 25°/25°C: 1.251 min., 1.255 max. *Distilling Range:* 207°-212°C. *Side Chain Chlorine:* None.

Uses: For the preparation of dyestuffs, pharmaceuticals, rubber chemicals, and other organic chemicals. A "carrier" in the dyeing of synthetic fibers. A special solvent.

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The Primary Aluminum Picture

	1960 Production	Present Capacity (figures in short tons)	Contemplated Expansions	Capital Outlay 1960 (million dollars)
U.S. companies:				
Aluminum Co. of America	727,000	853,250	172,000	$80.34
Anaconda Aluminum	56,625	65,000	0	2.51
Cerro Corp.	0	0	55,000	—
Harvey Aluminum	59,000	75,000	75,000	6.32(1)
Kaiser Aluminum & Chem.	488,077	609,500	0	16.24(2)
Ormet Corp.	190,000(3)	180,000(7)	0	—
Reynolds Metals	494,282	701,000	0	33.04
U.S. totals	**2,014,499(4)**	**2,483,750**	**302,000**	
Canadian companies:				
Aluminium Ltd.	637,800(5)	750,000	80,000	$70.00
Canadian British Alum.	88,500(3)	90,000	90,000	—
Chryslum, Ltd.	35,000(3)	38,000	0	—
Canadian totals	761,357(6)	878,000	170,000	—

(1) For fiscal year ended Sept. 30, '60. (2) Not including $10.44 million invested in other companies, principally in international aluminum projects. (3) Estimated by CW. (4) Total reported by The Aluminum Assn. (5) Not including production of about 155,000 tons by overseas affiliates. (6) Total reported by Dominion Bureau of Statistics. (7) Ormet's rated capacity.

Aluminum: Back on Growth Trail

With sales perking up and operating rate topping 80%, aluminum producers are regaining ardor for expansion.

When the over-all operating rate for U.S. aluminum producers rose to more than 80% of capacity last week —with Anaconda, Reynolds, and particularly Kaiser putting idle pot lines back into production—corporate executives began setting in motion a bevy of expansion plans that had been at a virtual standstill since last summer.

Latest forecasts still envision that present U.S. primary aluminum capacity—coupled with normal scrap recovery and imports—will be ahead of demand for the next two years or more, even in a healthy economy all the way.

But for a variety of reasons, the industry's idle capacity—nearly 500,000 tons/year in the U.S. and more than 100,000 tons/year in Canada—is not the deterrent to expansion that it was last summer. For one thing, there's increasing confidence in the ability of the North American companies to compete in the overseas markets, where consumption is growing fastest. There's increasing conviction that growth of domestic demand will accelerate over the next few years, with a particular boom in structural applications. And there's a fresh drive on the part of some companies for more vertical integration —both backward, toward bauxite mining and processing, and forward, toward fabrication of end-products.

Five Plans: In this environment, and with the knowledge that a lot of market opportunities may come and go during the approximately two years between a decision to expand and the onstream date, at least five North American companies are getting ready to build new aluminum reduction plants.

The only primary metal project now being carried on in the U.S. by Aluminum Co. of America is a modernization job at the Badin, N.C., smelter. But if the market upswing continues, Alcoa will push ahead with two expansion projects that have been on the books for more than a year: installing four new pot lines at Warrick,

Ind., and one at Massena, N.Y., to bring each of those smelters to their projected 150,000-tons/year capacity.

Harvey Aluminum—which only a couple of months ago got its capacity at The Dalles, Ore., up from 60,000 to 75,000 tons/year—has about made up its mind to double that capability all in one blow. Also, Harvey—which now buys all its alumina from Japan—is interested in having its own bauxite-to-alumina operation in Jamaica or British Guiana.

For Captive Metal: Cerro Corp.—which has attained a substantial position in aluminum extruding and fabricating by acquiring Fairmount Aluminum and United Pacific Aluminum—is nearing a decision on going ahead with the 55,000-tons/year smelter project previously planned by United Pacific. Cerro has taken over and obtained modifications in the electric power agreement that United Pacific had worked out with the Bonneville Power Administration; has optioned one site on the Columbia River in Washington and is considering two others; and is now rechecking its financing, engineering and marketing estimates.

And in the Canadian aluminum industry—which, to a much greater extent than its U.S. counterpart, is attuned to exports—two producers are thinking of increasing their primary aluminum capacity. Aluminum Co. of Canada—principal operating subsidiary of Aluminium Limited—has resumed construction work where it left off in '57 at Kitimat, B.C.; the aim, says the company, is to insure "that the two pot lines can be quickly and efficiently completed when the need arises."

Transatlantic Aluminum: Canadian British Aluminium—jointly owned by British Aluminium Co. (which in turn is owned by Reynolds Metals and Tube Investments, Ltd.) and Quebec North Shore Paper Co. (a subsidiary of Ontario Paper Co.)—is dusting off its blueprints for a 90,000-tons/year expansion that would double its present capacity. CBA says it has been running very close to capacity, sending most of its output to its British parent company.

These imminent expansions in North America should be viewed against a background of rapidly growing markets and production capacity throughout the world. At least four of the North American producers have new reduction plants—wholly or jointly owned—going up in other parts of the world. These and other foreign projects will tend to reduce U.S. aluminum ingot exports to those regions, thus make more U.S. primary metal capacity available for domestic markets.

From Surinam to Ghana: Alcoa's wholly owned Suriname Aluminum Co. has started its big project, which will include a 60,000-tons/year smelter, in Surinam, the bauxite-rich Dutch province on the north coast of South America. Construction has begun on the power dam, housing, laboratory, office and shops, but construction of the smelter itself will be timed to match completion of the hydroelectric development.

In addition to its direct and indirect interests in aluminum producers in Britain and Canada, Reynolds is going to be part-owner of reduction plants in two other countries. In partnership with the Venezuelan government, Reynolds International is planning to build and operate a 25,000-tons/year smelter in that country; and Reynolds will participate in construction of a smelter and also an alumina plant in Greece.

Aluminum in Antipodes: Kaiser Aluminum has entered into a 50-50 joint venture with Consolidated Zinc Corp. (London) to construct bauxite mining, alumina refining and smelting, aluminum fabricating, and electric power generating facilities in Australia, New Zealand and Tasmania (*CW, Dec. 3, '60, p. 25*). The two proposed reduction plants would have combined capacity of about 165,000 tons/year. Also, Kaiser has invested in new and expanding aluminum-producing companies in India and Spain, and is a prime member of a consortium that has been negotiating for a major project in Ghana.

Three affiliates of Aluminium are expanding their primary aluminum capacity: Indian Aluminium, Brazil's Aluminio Minas Gerais, and Nippon Light Metal Co. But the great bulk of Aluminium's overseas expansion program right now involves rolling and finishing mills, sheet mills, hot mills, extrusion presses and foil plants—in 19 nations.

While great growth is expected in those overseas markets (where per-capita aluminum consumption is at best only about 25% of the U.S. level), studies made both by industry people and by outsiders indicate that the North American producers will be busy trying to keep up with rising demands at home (*table, left*).

Nobody expects a continuation of the 11%/year growth rate that aluminum has maintained over the past decade; but even a 7% average annual gain—which seems conservative enough considering aluminum's potential in construction, canning, auto, aviation and electrical applications—would require nearly a doubling of U.S. capacity over the next 10 years.

U.S. Primary Aluminum: Past, Present, Future

(short tons)

Year	End-of-Year Capacity	Production	Operating Rate
'75 (est.)	6,500,000	6,000,000	92.3%
'65 (est.)	3,200,000	3,000,000	93.7%
'61 (est.)	2,490,000	2,100,000	84.4%
'60	2,468,750	2,014,499	81.6%
'59	2,402,750	1,954,112	81.3%
'58	2,194,250	1,565,557	71.4%
'57	1,841,750	1,647,709	89.5%
'56	1,775,500	1,678,954	94.6%
'55	1,609,000	1,565,721	97.3%
'50	855,000	718,622	84.0%

Coming In for Cash

Two companies that have been diversifying heavily into chemicals went to the money market this week.

(1) Continental Oil Co. (Houston, Tex.) is selling $100 million worth of 4½%, 30-year, sinking-fund debentures. About half the proceeds will be used to retire bank loans; the remainder will be used for capital investments and other general corporate purposes.

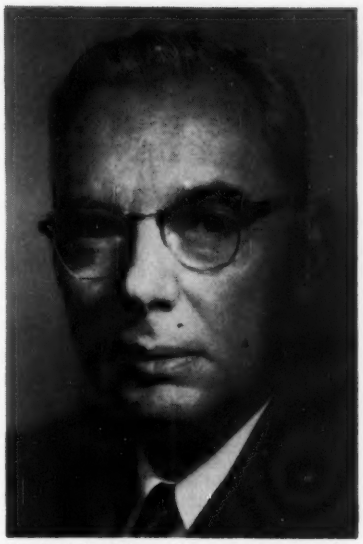
(2) Virginia Chemicals & Smelting Co. (West Norfolk, Va.) is offering 50,000 shares of the company's common stock, and 22 principal stockholders are offering 85,000 shares. Of the proceeds to the company, it's expected that about $625,000 will be used to expand capacity for hydroxylamine sulfate and sodium metabisulfite, and about $125,000 will go into expanding research laboratories.

Industrial chemicals account for about 65% of Virginia Chemicals' sales volume, which last year totaled $10.5 million and resulted in a net income of $631,000. In first-quarter '61 sales rose 20.7%, to $2.8 million, and earnings climbed 18.2%, to $182,000. First-quarter research outlays mounted 17.3%, to $95,000.

The company—headed by A. Kenneth Scribner—believes it is the largest U.S. producer of liquid sulfur dioxide; one of the four largest producers of sodium hydrosulfite; largest in zinc hydrosulfite; third in sodium metabisulfite; one of the top two in hydroxylamine sulfate; and No. 2 in zinc sulfate. It is a distributor of Freon and other refrigeration supplies, and formulates and packages a line of aerosol insecticides.

Physical Dip: Although Conoco brought its new cyclohexane plant onstream last fall, physical volume of its petrochemical sales dipped from 121,000 tons in '59 to 108,000 tons in '60. Other principal products: ethylene, butadiene, ammonia, benzene, dodecene, detergent alkylate, sulfonic acids, ethylene oxide and plasticizers. A plant for long-chain alcohols is to be completed at Lake Charles, La., late this year.

Conoco's stock interests in petrochemical concerns: Continental Carbon, 51%; Petroleum Chemicals, Inc., 45%; Mid-South Chemical, 45%; Calcasieu Chemical, 30.5%; Carlon Products, 31.5%; Bryton Chemical, 100%.



Carbide's Bliss: His uranium market is assured for the next five years.

Setting Uranium Terms

Following the signing last week of a $100-million contract with the Atomic Energy Commission, Union Carbide Nuclear Co. President Lyman Bliss finds his company's uranium future mapped out through '66.

The new contract replaces UCN's contracts, which would have expired March 31, '62, covering mills at Rifle and Uravan, Colo. The contract was negotiated on the basis of a limitation on uranium procurement set by AEC in '58 to guard against overproduction. Now only four other domestic mills out of 26 are still waiting to have their contracts renegotiated.

The new Union Carbide contract calls for delivery of 12,154,730 lbs. of uranium oxide between April 1, '61, and Dec. 31, '66. It stipulates that UCN must mill a fixed amount of U_3O_8 from ores purchased from small, independent miners. Each year, UCN may deliver 3 million lbs. of U_3O_8, of which only 2.5 million lbs. may be from its own ores.

As part of the long-term sliding price scale set up by AEC, Carbide will get $8.41/lb. until April 1, '62, $8/lb. after that. During the '62-'66 period all producers will be paid $8/lb.

AEC has now contracted for a total of 128.5 million lbs. of U_3O_8 in the post-'62 period. Estimated cost to the government: slightly more than $1 billion.

Brazil Still Booms

Chemical companies in Brazil may be worried by some of the new rules being laid down by the Kennedy Administration (see p. 34)—but not enough to slow their rapid expansion.

Among projects in the works:

Resana S. A. (São Paulo) plans to double its synthetic resin output by '65. The firm began production last year of sebacic acid refined from castor oil, under a license agreement with a U. S. company, Wallace & Tiernan.

Cia. Brasileira de Plasticos Koppers, a leading Brazilian producer of polystyrene, has increased its capital 250% to meet greater demands. Last year the company's monomer supplier, Cia. Brasileira de Estireno, more than doubled its capacity. Both firms are affiliates of Koppers Co. Inc.

Pechiney's subsidiary, Cia. Eletroquimica Paulista, has brought in $69,000 in capital equipment from Produits Chimiques et Electrometallurgiques (France) to boost potassium nitrate output.

Petrobras S.A., Brazil's state oil agency, has agreed to furnish raw material for a carbon black plant being built in Bahia by Companhia de Carbones Coloidias.

And Farbwerke Hoechst's subsidiary, Fongra Produtos Quimicos, will boost capacity of caustic soda, DDT, butyl acetate and other products at its Suzano, São Paulo plant. Caustic output will reach 2.3 million kilograms/year, most of it going to Brazil's expanding paper industry.

Meanwhile, to help boost exports, President Quadros has issued a decree allowing total or partial "drawback" of duty payments on raw materials, unfinished goods, parts, and goods for packaging, when these items are used in articles for export. In some cases the saving could reach as high as 60%.

With many firms winding up their large-scale investment programs last year, the rate of foreign capital flowing into Brazil dropped sharply, from $100 million in '59 to $66.7 million in '60. The U.S., which had held first place, slipped to second with $19.4 million, after Germany, which poured in $24 million, mostly in the auto industry. France was third with $5.4 million, followed by Japan with $4.8 million, and Britain with $3.5 million.

USDA Report on Use of MH-30 on Tobacco Shows:

According to USDA	According to Naugatuck
1 Tobacco experts prefer hand-suckered, flue-cured tobacco to chemically suckered samples (but can't always differentiate).	1 Such chemical and physical changes as are caused by properly applied MH-30 do not impair tobacco quality.
2 Chemically treated tobacco is different, chemically and physically.	2 Cigarette makers have demonstrated their ability to handle difficult materials in their use of homogenized tobacco dust and stems.
3 Chemically treated tobacco causes more difficulty in cigarette manufacturing.	3 Cigarette filling power is reduced less than 1% by use of MH-30.
4 Cigarette filling power of chemically treated tobacco is about 5% less.	4 No apparent differences in taste or smoking qualities are found in tobacco treated with MH-30 at the recommended time.
5 Flavor of prematurely MH-30-treated tobacco is inferior to that of hand-suckered—not when treated at the recommended full-flower stage, however.	5 Farmers use MH-30 mainly as a labor saver—if they didn't have it, a labor shortage would result in unsuckered and therefore inferior tobacco.
6 Because early treatment with MH-30 boosts yield, the farmer is likely to use the chemical at this more vulnerable stage.	

MH-30 Fight Flares Again

USDA report gives new ammunition to both sides in fight over use of growth regulator on tobacco.

Last week on the University of Kentucky campus, at Lexington, cigarette company executives, farm leaders and other members of the tobacco growing and manufacturing industry met to discuss the just-issued U.S. Dept. of Agriculture report on MH-30 (maleic hydrazide). Consensus: unless drastic action is taken in Washington, there will be no significant reduction in use of Naugatuck Chemical's (division of U.S. Rubber) growth regulator.

Two weeks ago the simmering battle between tobacco growers (who like MH-30 because it boosts yields, saves labor) and cigarette manufacturers (who dislike it because it makes cigarette manufacture more difficult) came to a new boil with the issuance of a research report that has been interpreted by local newspapers as putting USDA on the side of the cigarette companies (*CW Business Newsletter, May 6*).

The report, requested by a Congressional subcommittee, is based on tests of tobacco grown by experimental stations in nine states. Samples used in the tests were both hand-suckered and chemically suckered with MH-30 applied at the recommended time (at full flower), one week early, and one week late. Suckering—the chemical's function—is the removal of growth-robbing shoots from the lower stem.

Off the Fence: One cigarette company tobacco buyer close to the Washington scene says, "This is the first time the Agriculture Dept. has come off the fence on MH-30." Although the report itself contains mainly unadorned laboratory results (from which Naugatuck statistical experts have already drawn their own conclusions), USDA attached a paper on the "economic implications."

Main points as seen by USDA:

Loss of filling capacity caused by MH-30 will threaten shipments to high-duty countries such as Britain and Ireland (now taking 43% of U.S. tobacco exports).

MH-30's effect on taste and quality will decrease demand for U.S. tobacco in all foreign markets (exports account for 40% of sales of U.S. flue-cured).

If buyers have trouble recognizing leaf treated with MH-30, they will be wary of all U.S. tobacco.

One implication that hits even closer to tobacco growers' pocketbooks: "Foreseeable possible losses from reduced demand for loan holdings of leaf because of these problems may jeopardize continuation of a tobacco support program."

So Far, So Good: In rebuttal, Naugatuck says that in '60 more than 25% of the crop was treated with MH-30, but treated leaf was not discriminated against in auctions; the percentage of the '60 crop acquired by the government's stabilization program was at an all-time low; and exports, from April '60 to March '61, were 10% higher than in the same period a year earlier.

Cigarette companies have sniped at the use of the chemical almost since its introduction. Cigarette makers were alerted by tobacco farmers' earlier attempts to get around acreage allotments with yield-increasing innovations—e.g., new strains of tobacco plant and improperly used fertilizers. Both resulted in inferior leaves, made the fast-moving auctions hazardous for buyers, and increased the problem of making uniform cigarettes out of ever more variable raw materials. Both yield-boosting gambits were squelched by Dept. of Agriculture action—cutting price supports on the inferior products. Cigarette makers regard MH-30 as a comparable case, look for a similar solution.

Naugatuck has, nonetheless, steadily built its market for MH-30, now says that sales for tobacco (about half of all MH-30 sales) are "well over 100,000 gal./year." MH-30 is now used on about 25% of the U.S. crop, is unlikely to ever be used on more than 40%—small farms don't use it.

"The political overtones are tremendous," said one warehouseman at the Lexington meeting. It has been estimated that the use of MH-30 could increase tobacco growers' earnings by $100 million. On the other hand, a 5% reduction in filling power alone could cost cigarette makers $50 million. The shadow of the farm vote always hovers over Congress, and it is reluctant to take any step that might harm farmers. For the present, Rep. Watkins Abbitt (D., Va.), chairman of the tobacco subcommittee that now has the report, says only: "The report speaks for itself."

No Letup in Growth

Chemical industry growth is likely to continue at about double the growth rate for all U.S. manufacturing for at least another 10 years, according to one high-ranking industry executive.

While Du Pont Vice-President David H. Dawson expects that this growth wave will carry annual sales of chemicals and allied products to more than $54 billion by 1970—nearly double the current level—he is more cautious about predicting the industry's profits.

Problems that have been holding down chemical companies' earnings in recent years "are obviously severe, and will not be overcome by sales volume alone," Dawson declared last week in Richmond, Va., at the 14th annual convention of the National Federation of Financial Analysts Societies.

Relying on Strong Points: But Dawson—whose 28-year career with Du Pont has been in research, sales, and divisional and corporate management—is confident that the industry can overcome the cost-price squeeze sooner or later. "The industry in the past has demonstrated great vigor in research, continual emphasis on far-sighted management, and ability to control costs by technological improvements," he stated. "In the long run, it would be strange indeed if these capabilities did not convert its anticipated sales growth into increased earnings."

Dawson—a member of Du Pont's board of directors and executive committee—singled out four of what he considers "the larger opportunities" for chemical industry sales growth:

- Replacement by synthetic polymeric materials of large volumes of glass, paper, wood, leather, metals.
- Further replacement of natural fibers by synthetics, and the development of techniques that will replace the still cumbersome procedures of converting fibers into textile products.
- Chemical control of the still unconquered diseases.
- Provision of adequate food supplies for a rapidly expanding world population, and further increases in labor-productivity of agriculture by pest control and yield improvement.

Four Routes Still Open: Dawson, who holds a Ph.D. degree in physical chemistry and an honorary doctorate in engineering, outlined four major routes that have opened large markets to the chemical industry in the past. These were substitution, principally for natural products, such as cellophane replacing paper in certain packaging applications; development of new uses that reduce costs, as in use of urea herbicides that have greatly reduced the labor required for chopping and hoeing cotton; consumer convenience, exemplified by aerosols; and development of new materials to meet extreme physical requirements — such as fluorocarbon resins for use in missile fuel systems, and other materials that are being created in chemical laboratories to meet new physical standards.

Du Pont's Dawson: By '70, a 100% jump in U.S. chemical industry sales.

"All of these paths that have proved so fruitful remain open," Dawson told the analysts. "There is nothing foreseeable in technology or in the economy that indicates that any of them will be closed or that opportunities for new research developments will disappear. Indeed, the challenges to the industry—and hopefully the rewards—should increase in the years just ahead."

So Dawson thinks the chemical industry will keep on growing at a rate close to double that of the nation's economy as a whole. "Despite talk of the industry's increasing maturity, and despite the obvious fact that it is patently absurd to expect such a trend to continue for the indefinite future, I am forced to conclude that it is reasonable to expect that it will continue for at least another decade," he said.

Shampoo to Glue

Impressed by success in selling hair products and toiletries through supermarkets (more than 50% of company sales are through these outlets), Helene Curtis (Chicago) President Willard Gidwitz figures he can sell nearly any chemical specialty that way.

To test this theory, Helene Curtis has bought Detroit household adhesives and home repair products manufacturer Plastic Products Co.

Gidwitz says Plastic Products, with sales of $2-3 million/year, wouldn't, in itself, have been big enough to interest him, but that it is in the process of acquiring two other companies in the same field. Gidwitz ascertained that Plastic Products President Richard Covert (who will keep his job) will in all likelihood be able to go ahead with the mergers, give Curtis a package with $8-9 million/year in sales.

Late this year, Curtis will enter yet another new field when it begins test marketing an anti-indigestion wafer.

Manganese Hold-off

At its stockholders' meeting last week, Foote Mineral reported first-quarter earnings of $23,442, down 90% from a year ago. The big reason was heavy competition for a small nongovernment lithium market. But also contributing was slow activity in steel, to which Foote's welding and electrolytic manganese fortunes are tied. One result: a deferment of Foote's proposed 20-million-lbs./year electrolytic manganese plant at New Johnsonville, Tenn. (*CW, July 23, '60, p. 25*).

Meanwhile, the company is checking into feasibility of building an electrolytic manganese plant at Carbonia, Italy (next to Montecatini's coming electrolytic aluminum plant).

There is no serious overcapacity of manganese in the U.S. Foote has capacity of 28 million lbs./year, Union Carbide Metals has 18 million lbs./year. American Potash says it will have its 10-million-lbs./year plant at Aberdeen, Miss., onstream by November (although others feel that APC won't be a threat for a year and a half to two years). U.S. Manganese (40% owned by Vitro Corp.) is still piloting a variation of the Sheer-Korman Hierarc process for recovery of rhodonite ore, has no production plans.

national roundup

Rounding out the week's domestic news.

Companies

Procter & Gamble Co. (Cincinnati) has completed a two-for-one stock split, increasing the number of its outstanding shares to 42 million (out of 50 million authorized). At the same time, the board of directors voted to increase the quarterly dividend rate by about 8%, to 35¢/share.

Kaykor Products Corp. (Yardville, N.J.) has purchased the Kaykor Industries division of Kaye-Tex Mfg. Corp. (New York) and is now operating as an independent company. Kaykor produces vinyl, styrene, and other thermoplastic sheet laminates. Kaye-Tex will continue as a producer of flexible vinyl sheeting.

Koppers Co. (Pittsburgh) has added to its Tar Products Division two recently acquired producers of asphalt emulsion materials for use in maintenance and improvement of concrete and blacktop highways. The two acquisitions: Highway Emulsions (Sidney, O.) and Highway Emulsions (Dayton, O.).

Benjamin Moore & Co. Ltd. (Toronto, Ont.)—Canadian subsidiary of Benjamin Moore & Co. (New York)—has purchased Heaman Paint Co. (London, Ont.). Heaman Paint—producer of chemical coatings—will operate as a division of the Toronto-based firm.

Vulcan Materials Co. (Birmingham, Ala.) is moving to buy up some of its outstanding preferred stock. It has offered to purchase up to 20,000 shares of its 6¼% cumulative preferred stock (of which 108,752 shares were outstanding as of Dec. 31) at $105/share and up to 10,000 (out of 53,529 outstanding) shares of its 5¾% cumulative preferred stock at $96.50/share. Vulcan's chemical operations include the Frontier Chemical Co. and the Vulcan Detinning divisions.

Expansion

Petroleum Products: Tidewater Oil Co. (Los Angeles) has awarded a $20-million contract to Bechtel Corp. (San Francisco) for construction of a 20,000-bbls./day Isocracking unit and 50-million-cu.ft./day hydrogen generating plant at Tidewater's Avon, Calif., refinery. This project—to convert overly plentiful distillate stocks into premium gasoline and other hydrocarbons—is to be completed by mid-1962 (*CW, April 29, p. 34*).

Chemicals: Wyandotte Chemicals Corp. (Wyandotte, Mich.) has purchased a 28-acre waterfront tract adjacent to its South Works at Wyandotte. The company says this will "alleviate crowded conditions and provide land for future expansion."

Plastic Bottles, Glass: Owens-Illinois Glass Co. (Toledo, Ohio) is expanding in two of its main fields this year. Equipment for producing blow-molded plastic bottles is being installed in a leased building in St. Louis and at an existing O-I plant in San Jose, Calif.; and another plant is under construction at Jersey City, N.J. The company already is producing plastic bottles in one Canadian and seven U.S. plants. And O-I's Libbey Glass Division is about to build a table glassware plant on a recently purchased site in City of Industry near Pomona, Calif.

Paper Products: The recently organized Southern Paper Co. (Wiggins, Miss.) plans to build a $500,000 plant at Wiggins to produce toilet paper and paper towels from purchased wood pulp. Voters in the locality last fortnight approved a $250,000 bond issue to help pay for construction and equipment.

foreign roundup

Rounding out the week's international news.

Maleic Anhydride/Italy: Scientific Design will engineer a 10-million-lbs./year maleic anhydride plant to be built at Colleferro, Italy, for Bonbrini Parodi-Delfino S.p.A. It is due onstream in mid-'62.

Caustic-Chlorine/Germany: The first of three new chlorine alkali electrolysis units at Farbenfabriken Bayer's Uerdingen plant is onstream. Previous capacity: 170,000 tons/year of chlorine; the three units will boost this to 230,000 tons/year. The new unit now operating will produce 30,000 tons/year, the other two will be for 15,000 tons/year each.

Nitrogen/Southern Rhodesia: Seeking cheap nitrogen to spur a needed agricultural revolution, Rhodesia's Federal Ministry of Commerce & Industry has invited 12 international companies to submit proposals for a $22.4-million nitrogenous fertilizer and explosives project. Proposals are due in September.

Camphor/India: Du Pont will contribute technical know-how to a new company, Camphor and Allied Products Ltd., being set up with Du Pont participation by Dalal & Jhaveri Private Ltd. (Bombay). The company will be capitalized at $2.1 million.

Coming: Credit Aid for Exporters

Chemical companies with a stake in exports are waiting with keen interest as a team of government officials, bankers, and businessmen work out a program that may be a big help in boosting international sales. They are forging the U.S. Export-Import Bank's new export financing and guarantee program.

Traditionally, Eximbank's principal role has been long- and medium-term financing of capital equipment exports, as well as granting loans to foreign governments and central banks to help them pay for U.S. exports. It also issues credit and political risk insurance for medium-term-financed capital goods exports.

But as the government became concerned with the mounting U.S. balance of payment deficit and set out to expand exports, it became clear that a major handicap for U.S. exporters was their lack of credit facilities, compared with those offered by competing countries.

In May '60, Eximbank took the first step toward correcting the situation by offering guarantees covering noncommercial, or political, risks on short-term export transactions with terms of up to 180 days. This covers inconvertibility or nontransferability of foreign currencies (when a foreign buyer deposits his payment to the exporter in local currency and then is unable to convert this into dollars, Ex-Im will pay the exporter for 90% of the deposit), prevention of delivery of goods because of a law or regulation beyond the control of the buyer or seller, cancellation of the import license, war and expropriation by foreign authorities. In such cases, the bank pays up to 90% of the loss.

At the same time, Eximbank improved the insurance program for medium-term capital equipment exports.

Slow Start: The short-term political risk insurance program got off to a slow start. Exporters complained that it did not cover commercial risks, and that they had to take insurance for all their exports, not only those to politically risky areas. Still, it was a help. For companies financing short-term exports out of their own coffers, it helped narrow down the credit decision to commercial factors. And it made it easier for a company to get the financing from its bank. If it didn't approach the kind of coverage foreign competitors could get from their governments, it at least supplemented the commercial risk insurance offered by the one U.S. private company in the business.

By Dec. 31 only 162 exporters had taken out contracts, covering a mere $120 million in business volume. Use of the guarantees was steadily increasing, but this clearly was not the program to solve the exporters' credit woes.

New Program: Last February President Kennedy ordered Ex-Im's new president, Harold Linder, to devise a program of credit facilities that would put U.S. exporters in "full equality" with their foreign competitors. In March, Ex-Im presented the outlines of this program. Part of it is already in effect, but the most important part for chemical exporters is still being worked out, probably won't be ready for about two months.

For capital goods exporters and contractors, the bank will now give advance commitment for financing and guarantees "where appropriate." This could be a major aid to such companies, which have often seen contracts go to a foreign competitor who could offer definite terms, while the U.S. companies had to wait months for Eximbank approval.

How this feature will work out in practice remains to be seen. The bank doesn't intend to make any snap judgments. It will still carefully review a proposed deal, but will now grant approval—with conditions—before the board of directors actually gets around to giving the official nod. This could chop several weeks off the lag time.

Also in the medium-term field (180 days to five years), the bank has extended its financing and insurance coverage to exports of semifinished and durable goods. How this will work out is also not clear, since each deal will be decided on a case-by-case basis. It won't help chemical exports, which are sold on a short-term basis,

Eximbank President Linder is shaping program to give U.S. exporters 'equality.'

Export insuranceman Morrison believes exporters are bad judges of their risks.

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but it may have a big effect on exports of fertilizers.

The bank will also extend its medium-term coverage to exports of petroleum equipment sold to publicly owned oil companies, and will speed up its decisions by relying more on credit experience and credit reports, rather than on financial statements.

But the part of the program of direct interest to chemical exporters is still being worked out. This will extend commercial risk insurance to short-term imports, along with the political risk coverage already available.

Since the Eximbank has offices only in Washington, it wants to use the facilities of local insurance companies and banks to handle the new program. Moreover, it wants as much as possible of the program to be handled privately. Several plans are being examined, involving ideas like setting up a special export financing company, backed by Ex-Im insurance, or having all export credit insurance handled by private companies, which would underwrite the commercial risks themselves while Ex-Im would guarantee the political risk insurance.

By and large, chemical companies are reserving judgment on the new program. No matter how the mechanical details of the program are worked out, the crucial question is, "How much will the insurance cost?"

Cost has been the big reason why so few chemical companies use the short-term political risk coverage now available. The rates themselves are moderate and on a par with those offered by foreign credit agencies—25-50¢ per $100 of gross invoice value, depending on the terms. The catch is that the exporter has to insure all his exports not covered by a letter of credit, even though he wants it for only a fraction of his volume. Under this system, one company figures, it would have to spend $200,000 to cover the $5 million in credits it considers politically risky.

This is where foreign producers have the biggest credit advantage over U.S. exporters. They can either take out insurance for specific shipments, or, if they have to get blanket coverage, pay rates that vary by product, country, credit experience, etc.

West Germany's export credit insurance program is probably the most liberal. If he uses government insurance, a German exporter has to take both political and commercial coverage. He can get commercial coverage alone from a private company. He can get coverage for a single transaction, or on a global, or blanket, basis. In any case, the cost varies by country of destination. In a reasonably stable country such as Brazil, Argentina, Ceylon, or Turkey, it is close to 1.5% of the total worth of the contract for short-term insurance, with coverage against commercial risk around 70%, and about 80% for political risk. For less stable countries, the cost can go as high as 3%, the coverage down to 50%.

French chemical exporters have to take out blanket political and commercial coverage if they want any government coverage at all. But, depending on the risk involved, rates vary from 0.3% to 1.5%, while coverage is 80% for the U.S. and Canada, 75% for most others, and 70% for exceptionally risky cases.

Britain divides countries of destination into four groups, with rates for the highest risk group four times as much as for the lowest. Under the reduced premium rates announced April 12, the average rate for comprehensive short-term coverage is less than 0.5%. The short-term policy is sold for the exporters' total sales, but the rates vary by contract. Coverage ranges from 85% for losses due to insolvency or default of the buyer to 95% for losses after export, but doesn't vary by country or credit period.

Competitive Terms: Exporters frequently complain that they can't meet the terms offered in places like Latin America by European competitors aided by government credit programs. Actually, credit terms on chemicals are limited to six months by all the major government credit programs, so the U.S. program will put U.S. exporters on an equal footing in this respect. And if fertilizers are approved for medium-term insurance, U.S. producers will be in good shape to meet the tough competition in Latin America, especially since medium-term insurance is offered case by case, not on a blanket basis.

But this won't end the terms problem. Nigel Morrison, vice-president of Intercredit Agency (the only private company offering commercial risk export insurance), points out, "We know that some of our foreign competitors

are giving terms which we cannot or will not match. When they are doing so they are not doing so with insurance."

One foreign company, for example, has granted terms of as long as 360 days on soda ash to Latin America—twice the term covered by its country's insurance program.

No Miracles: Most exporters agree that improving credit facilities will be a big help; but even if Ex-Im succeeds in making the U.S. program "second to none," the U.S. export problem won't be solved.

Chemical exporters vary in their estimates of how much such a program would help. Economic, full coverage would enable one fertilizer exporter to boost business fivefold, or at least "substantially," he asserts. A major chemical producer thinks a competitive program would let him triple sales in at least one South American country. Generally, chemical exporters are optimistic about the results of a good credit program, but not quite so bullish.

One reason there won't be any miracles, of course, is that European producers are willing to take credit risks beyond their insurance coverage, and offer stiff competition on other counts as well.

More important, probably, is the fact that most chemical exports go to low-risk areas—Europe and Canada—where credit terms are not an important competitive factor. Even with its outstanding facilities, only about 15% of Germany's total exports are covered by credit insurance.

And a good chunk of exports to the riskier underdeveloped countries are paid for by tied ICA funds, which makes credit unnecessary.

State of Mind: Perhaps the most important factor in the success of the Eximbank's upcoming program will be the attitudes of the exporters. Morrison is quick to point out the faults of the Ex-Im program as it now stands, but he also believes that U.S. companies haven't taken advantage of the credit facilities that are available.

Few chemical companies have used the commercial risk insurance offered by his company. They feel it is too expensive. Morrison maintains that his average rates run about 0.5% for commercial risks, that taken together with the Ex-Im political guarantee the over-all cost works out about the same as the insurance available to foreign competitors.

Some chemical companies object to having to take out insurance on any but the "risky" shipments. Experts point out that this is an unrealistic basis for underwriting risks, unless the program is subsidized by the government. Intercredit doesn't insist on insuring all of an exporter's accounts, although it does insist on covering all of the major ones. But, says Morrison, "exporters are remarkably bad judges of losers, and we have seen exporters cover only a part of their business, and then have losses among the buyers not covered."

Chemical companies have mixed feelings about political and commercial coverage. Smaller companies tend to see the greatest value in the commercial coverage, since they don't have large credit departments of their own, and sometimes have to go to the banks for the financing. Larger companies feel they can handle the commercial risk themselves, but want noncommercial protection.

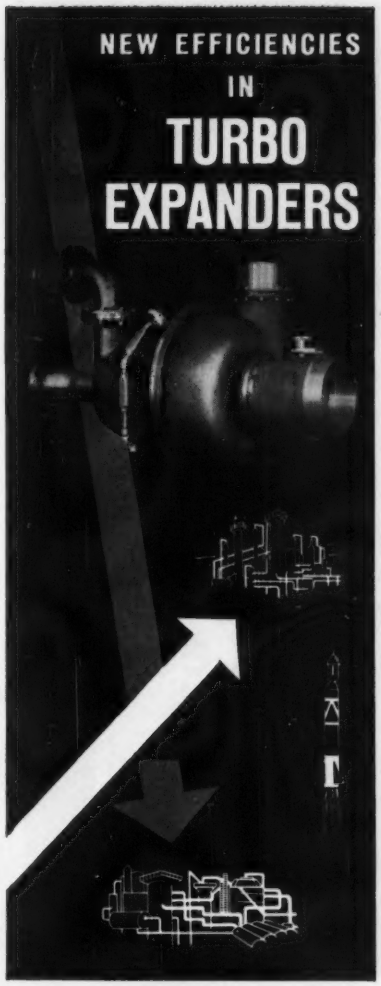
Morrison feels this is a misguided approach, that exporters should be covered for both kinds of risks, since they are intertwined and neither is predictable.

One reason large companies have made relatively little use of commercial risk insurance may be a defensive attitude in the credit department. The credit managers of two big companies tell *CW* that their companies didn't need commercial risk insurance because they have a credit department, their idea being that insurance is a substitute for a credit department.

Morrison thinks this is a mistake. "You call a fire engine even though you have fire insurance," he replies. Intercredit bases its charges partly on a company's credit performance, so that a good credit department helps a firm get cheaper insurance. Insurance won't cut down their losses if they haven't had any to start with. The question, says Morrison, is "how much sales have they lost by not giving credit."

And there are other reasons why some chemical companies are not enthusiastic about the present credit program, as it stands and as it may shape up.

One firm (of good reputation) says that it goes into the export market only to dump material it can't sell



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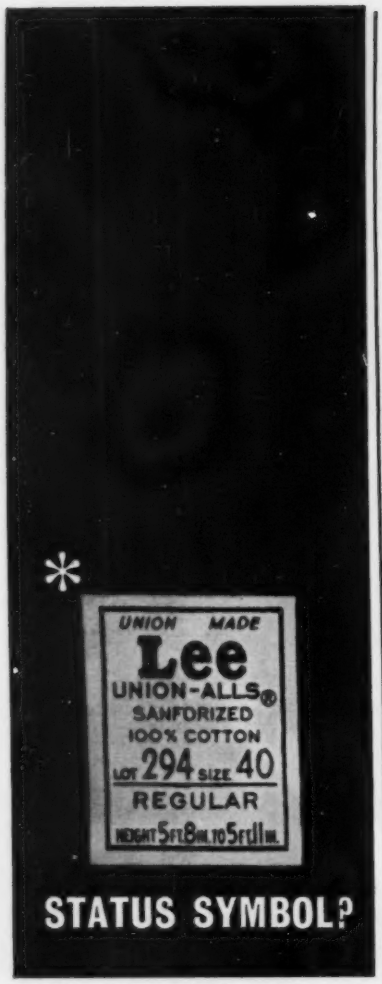

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domestically, and that its margin is so low in such cases that it has no room for insurance charges. Another company feels it just can't compete on the international market, wants government aid in the form of free insurance.

But most chemical companies have come to consider exports as an important part of their sales, and believe they can hold their own in the world marketplace. If the Eximbank comes up with a useful tool in the form of a good credit program, the industry as a whole can be expected to use it.

Quadros Cracks Down

Along with his stiff new economic measures (CW, April 1, p. 24), Brazil's President Janio Quadros has dished out some controversial new rules aimed directly at business.

The latest rule puts industrial and commercial firms in the education business. With a Presidential decree, Quadros has put teeth in a constitutional provision requiring establishments of all types which employ 100 or more employees to provide free primary instruction for workers and their families.

If they don't want to set up schools, they may pay the educational costs to the government or give their employees scholarships. Firms not complying within 60 days of the decree—issued last month—will be barred from bidding on government contracts, will get no tax or import favors, or be eligible for government loans.

In his first legislative request, Quadros is pressing for an antitrust, or "abuse of economic power," law. The bill would open to criminal prosecution companies restraining trade, monopolizing markets, limiting output to force price rises. It bans tie-in sales, company-splitting to secure tax advantages, and "abusively increasing prices to obtain abnormal profits." Where no competition exists, "excessive" profits would be barred. Convictions would carry penalties of fines and up to five years in jail.

Administration would be in the hands of a five-man appointive committee, which could delegate powers to city mayors and other officials.

Still another proposal stirring up debate is a sliding salary scale, tied to price levels and adjustable every six months.

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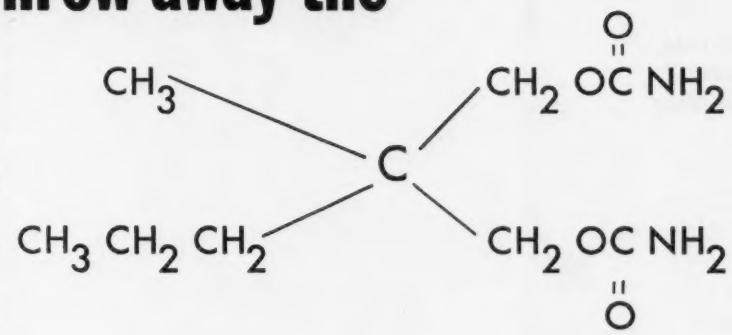

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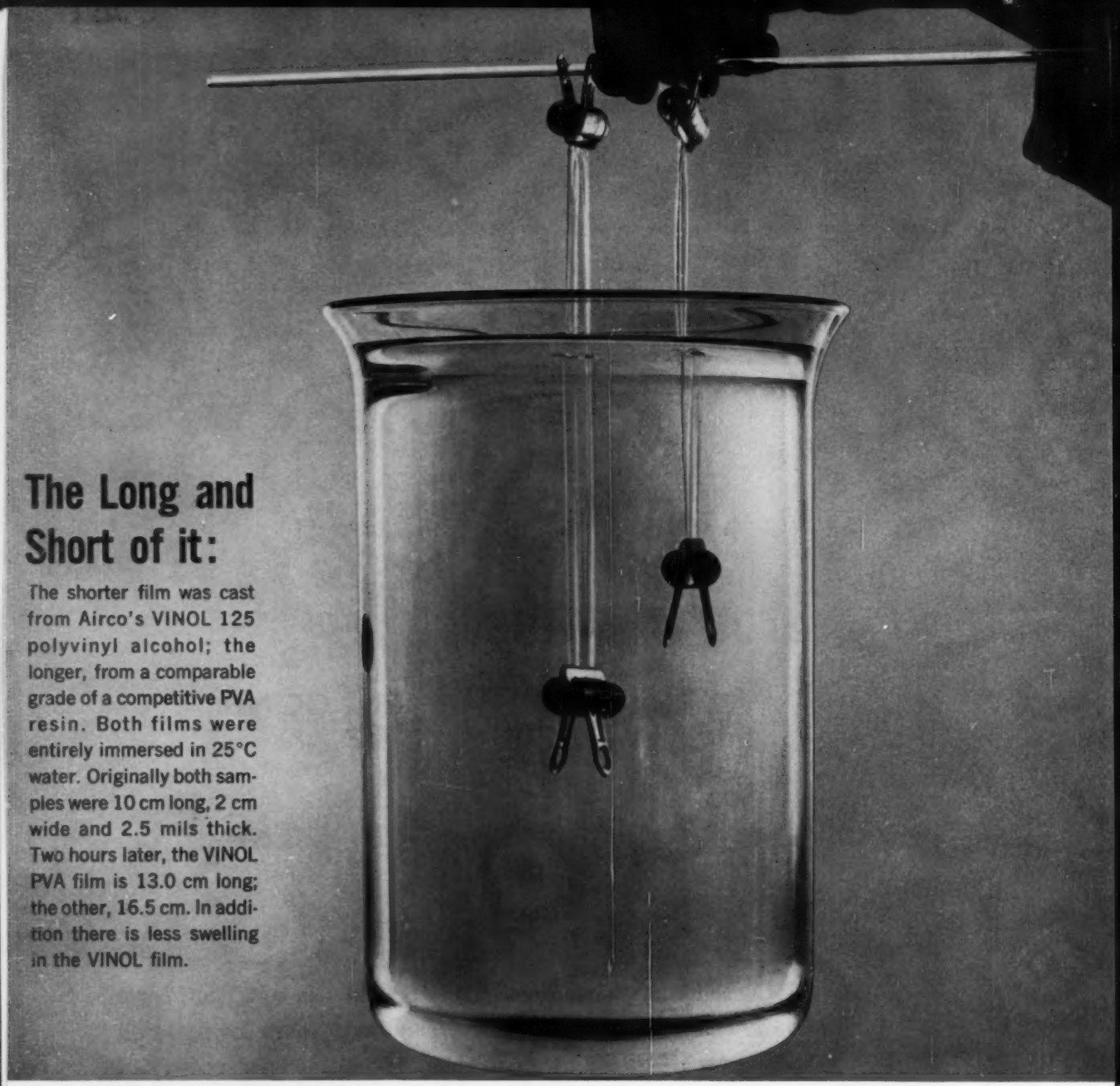

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To make up for loss of household appliance business, porcelain enamel makers are seeking new consumer and industrial uses for their product. Most promising: coating of auto exhaust systems.

Push in Porcelain Enamel

The household appliance industry, long the major consumer of porcelain enamels, now is shifting its favor toward baked-on organic coatings. They are easier to apply, are generally cheaper and practically as durable as porcelain enamel. Moreover, achievement of improved air-drying organic coatings for appliances would accelerate the move away from porcelain enamels. To offset these losses, the porcelain enamel industry is driving for new markets.

A look at the breakdown of the porcelain enamel market underscores the importance to enamel makers of the home appliance field. It explains the urgency of their search for new outlets to replace losses in the appliance area.

It's estimated that last year* ranges and other cooking and heating equipment accounted for 29% of porcelain enamel sales. Refrigerators and freezers took 14%; home laundry equipment and dishwashers, about 18%. Other sources of sales were: water heaters, 7%; plumbingware, 9%; architectural, 11%; signs, 1%; lighting fixtures, 1%; exhaust systems, 1%; hospital ware and enameled utensils, 2%; all others, 8%.

Success—or lack of it—in finding new markets for porcelain enamels is of keen interest to the chemical specialties field. At stake in the $400-million porcelain enameling industry is a chemical specialties market estimated at $40-50 million/year. Products include borax, clays, acids, metallic oxides and rare earths that are used by such major commercial frit manufacturers as Ferro Corp. (Cleveland), Chicago Vitreous Corp. (Chicago), Ingram-Richardson, Inc. (Frankfort, Ind.), The O. Hommel Co. (Carnegie, Pa.) and Pemco Co. (Baltimore, Md.) as well as by porcelain enameling companies ranging in size from small medallion manufacturers to giant appliance makers.

On the Road: The auto industry, though one of the smaller markets for porcelain enamel at present, seems to hold the brightest hope for new markets. Sparking optimism: porcelain enameling of exhaust systems (*CW, Dec. 17, '60, p. 31*). American Motors is currently the only U.S. company using ceramic-coated mufflers and tailpipes as original equipment, but other auto companies are thought likely to be seriously considering using ceramic-coated equipment. If others adopt the idea this could be a 12-million-lbs./year market for frits alone—figuring about 1 lb. of frit for each muffler and ¾ lb. for each tailpipe.

Encouraging as the new-car market looks, it's the replacement market that really interests the porcelain enameling industry. Trade sources peg the present amount spent for new mufflers and tailpipes each year in the U.S. at around $500 million. Sears, Roebuck and Montgomery Ward are already marketing ceramic-bonded mufflers (price range: $9-$12). And a number of smaller companies in Houston, Chicago and Los Angeles are turning out units for sale by themselves or by others. Walker Manufacturing Co. (Racine, Wis.), which supplies the mufflers and tailpipes for American Motors (another company does the coating), expects to sell products for the replacement field in '62 under its own label.

A possible dark cloud on the sunny horizon of ceramic-bonded exhaust systems might be the successful commercialization of an asbestos-reinforced phenolic plastic muffler, which an Ohio company will begin producing (at the rate of one every 15 seconds) in the near future.

Porcelain enamel makers are working on internal coatings for intake and exhaust manifolds of autos as well as for below-the-door panels, where splashing from salt used on icy roads causes serious corrosion problems.

Bright Light: An area that seems to hold considerable promise for expanded use of porcelain enameling is that of electroluminescent lighting. A unit consists of a porcelained steel sheet with a ceramic-phosphor coating. Though Sylvania Electric Products Inc. (New York) has had its Panelescent lamps on the market since '50, and GE and Westinghouse have also been working in this area, widespread use of electroluminescence has developed only recently.

Some indication of the current interest in electroluminescence is evidenced by the following:

- In Chicago a skyscraper now under construction on Wacker Drive will be the world's biggest glow-in-the-dark structure, will utilize electroluminescent panels to create the effect.
- In Atlantic City the use of electroluminescence for airport taxiways

* Figures are for porcelain enamel on sheet steel only; porcelain-enameled cast iron and porcelain enamel on aluminum are excluded.

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DIMENSION

Porcelain enamel, an inorganic substance chemically bonded under intense heat to a metallic-base material, is a special form of glass. It bears no relation to any form of organic "enamel" coating.

It is produced in smelters, in much the same way as other types of glass, from raw materials such as borax, silica sand, feldspar, and metallic oxides. Emerging from the smelters at 2600 F, the molten enamel glass is cooled and broken into small flakes of frit (from the French "to break" or "to fry." Both definitions apply, since it is broken and fried).

Shipped to the enameler, the frit is ground with water and clay to form a creamlike "slip," which is applied to a prepared base metal by dipping or spraying. The resulting coating is dried, then fired in a furnace at 1500 F if it is a steel enamel, or at 1100 F if applied to aluminum.

will be shown publicly for the first time next week. Runways are not far behind in development.

• About two weeks ago the largest single-panel electroluminescent lamps yet produced on a commercial basis (8 x 2 ft.) came off the Sylvania production line.

• In California last month, a new line of lamps, made weatherproof by encapsulation in ultraviolet-resistant epoxy resin, was introduced in California. The lamps are designed for use in highway signs, advertising and house numbers.

And electroluminescence appears to have a firm grip on present applications. Chrysler Motors is using this lighting method on the dashboard of its Chrysler and Imperial lines. Ford Motor is using it on its tractor line. Sunbeam and Sessions use it for clock faces and General Telephone & Electronics (of which Sylvania is a subsidiary) uses it for some of the phones produced by its Automatic Electric Co. subsidiary. In addition Sylvania is turning out a line of radios and electronic devices that use the principle. Sylvania is also now producing a light switch and a night light that use electroluminescent lighting, has sold well over 10 million of these units in the last few years.

In addition to applications mentioned above, the porcelain enamel industry is working on increased use of its product on farm equipment (fertilizer spreaders, silos, incubators), transportation equipment (on trucks, for instance, exposed to corrosive atmospheres) and for electrical equipment.

Building Going Up: An improving growth area for the porcelain enamel industry is the building market. The popularity of curtain-wall construction in office buildings, schools and industrial buildings has boosted sales of porcelainized steel, and it's expected that the architectural field will account for considerably more than the 11% of total porcelain enamel sales it now represents.

The new Chase Manhattan Bank Building (New York) contains relatively large amounts of porcelain enamel.

Residential housing has not proved to be much of a market, even though the industry has made strenuous attempts to interest builders in the material. The growing market for prefabricated houses could well revive interest in the use of porcelain enamel for residences.

Make It Easier: In addition to looking for new markets for porcelain enamel the industry is working to develop better enamel frits and special steels. The improved frits allow lower temperatures to be used, opening markets where high temperature might warp thin-base metals.

The special steels combined with better frits would make possible one-coat porcelain enamel applications, which would cut down per square foot costs. Another recent improvement in processing is direct-on porcelainizing, recently patented (U.S. 2,981,633) by Chas. Pfizer & Co., which also allows faster coating in a one-coat system.

Full Circle: Though there seems little doubt that porcelain enamel will continue to lose out in some markets, the industry seems well on the way to making up losses in one area by gains in another. A measure of the success of this effort may be found in one paintmaker's warning that the coating industry should wake up to the new threat posed by the porcelain enamel finishes.

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RI-111

Certified List Change

A new group called Institutional Research Council, Inc. (New York) has been formed to serve consumers of cleaning and maintenance materials, textiles, paints and other products.

The council will take over the sponsorship of the Certified Products Program, formerly operated by the American Hotel Assn., and will also develop product standards and do research.

Joint organizers of the group: American Hotel Assn., American Library Assn., American Motor Hotel Assn., Hospital Bureau, Inc., and National Executives Housekeepers Assn.

The council's first project: to encourage manufacturers of paints, textiles and cleaning supplies to submit their products for listing in the 1962 Certified Products List, scheduled for release next February. It points out that suppliers will now have to meet only one set of standards (many specialties makers don't want any) instead of seeking product approval from many organizations.

From Cone to Cosmetic

A material that flopped as a nose cone ingredient in missiles has been cast in a new role by a Florida cosmetic maker. A rubber chemist, Robert Grossman, of Miami, Fla., once president of Allied Rubber Products (Detroit), became interested in the material as a fingernail and toenail hardener. He acquired rights last year and recently introduced a product called Robert's Nail-Tone.

Described only as an "uncommon earth" the material was originally intended as a surface hardener in nose cones, where it was supposed to melt and fuse with the metal. However, it crumbled into a powder instead of melting.

Product claims say that it hardens nails and prevents splitting, removes fingernail ridges, buffs nails to a high gloss and resists harmful effects of detergents, nail polish remover and some acids.

Tests, according to Grossman, show that the powder, contains sodium, aluminum, iron, copper, nickel and titanium, is nontoxic and nonallergenic. He also says that it cannot be removed from the nail by lye, bleaches and other household chemicals and is not affected by these materials.

It's still undetermined whether the nail absorbs the powder or whether the product causes a physical change in the nail.

The material has a specific gravity of 2.19, and 80% of the particles are smaller than two microns. It is processed by heat and pressure into marketable form.

First sales last fall were to beauty parlors and department stores in the Miami area. Today distribution is still spotty, mostly in Florida and Michigan. Grossman plans to extend distribution to a national basis this year, limiting outlets to department stores.

Sales have climbed from zero last October to $45,000/month in April. Nail-Tone, Inc. maintains no sales staff, does no advertising at present.

Nail-Tone's biggest appeal apparently is to men, mainly executives and professionals, as a substitute for a manicure. Other users are believed to be women who either are allergic to nail polish or have jobs in which nail polish chips easily or is prohibited.

A ⅛-oz. bottle retails for $1.50. Suggested application is a three-minute buffing twice a week. The white powder is poured into the palm and briskly rubbed onto the nails.

Other commercial applications being explored: polishing of lenses, glass of all sorts, and metals.

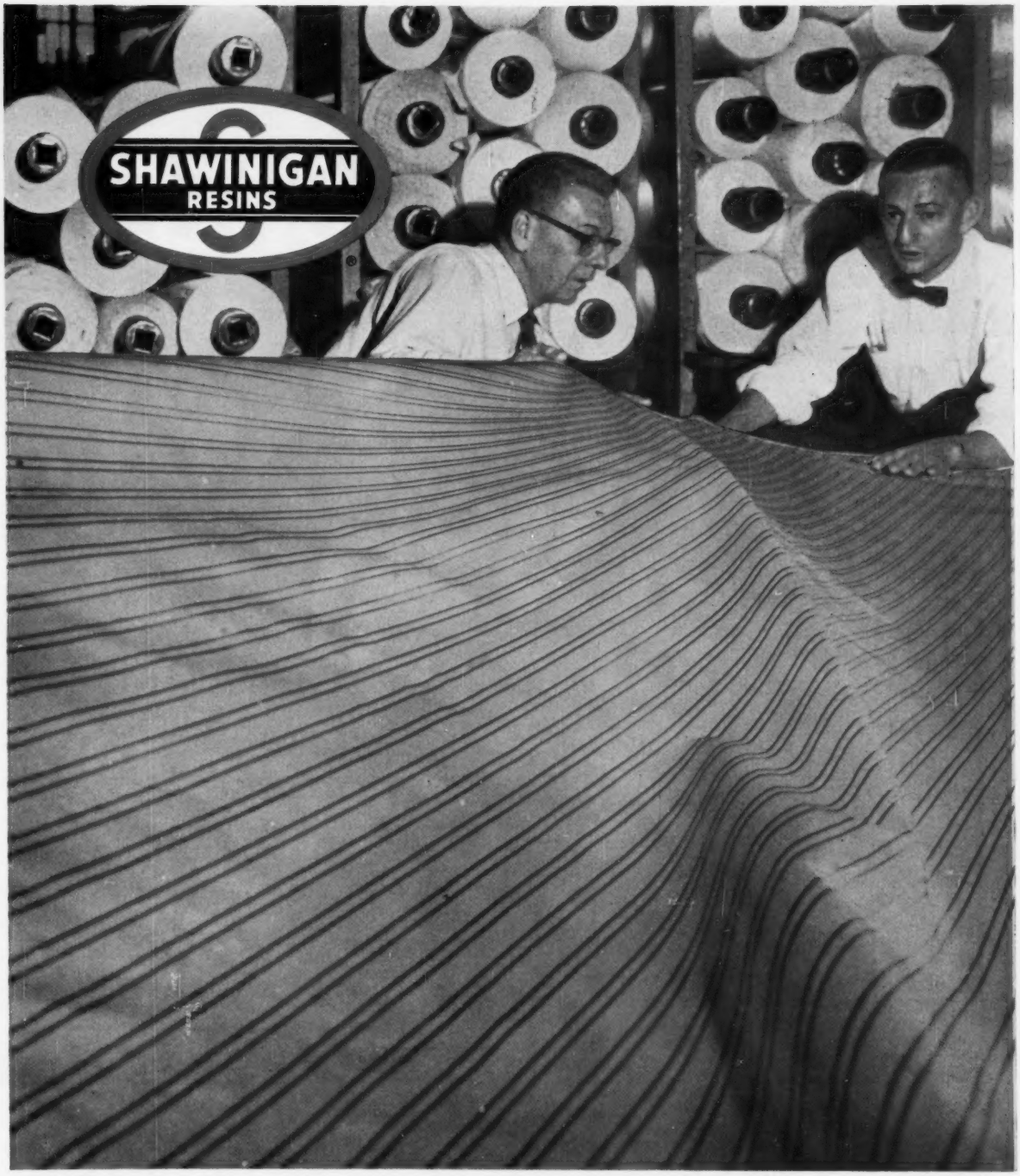
Specialty Makers Meet

Specialties makers will convene next week in Chicago's Drake Hotel for the midyear meeting of the Chemical Specialties Manufacturers Assn. Highlighting the convention will be a well-timed discussion of specialties for outer space, as well as papers on insecticidal aerosols, new developments in floor finishes and the annual product surveys for '60.

Another topic on the agenda, sure to get close attention, due to recent court rulings, will be hazardous-substances labeling.

Guest speakers at the May 15-17 meeting will be Larry LeSueur, CBS news correspondent; Clifford Rassweiler of Johns-Manville Corp., and author William Hazlett Upson. CSMA expects attendance to be more than 1,000.

Sunday and Monday will be devoted to business meetings of the various boards of CSMA. General sessions are slated for Tuesday and Wednesday.



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ESSO STANDARD, DIVISION OF
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ESSO

Washington
Newsletter

CHEMICAL WEEK
May 13, 1961

Higher freight rates in movement of chemicals by barge may result if "user charges" are imposed by the federal government. The Kennedy Administration is considering recommending that Congress authorize such charges to help recover at least part of the federal investment in inland waterways. Legislation calling for such charges has been introduced in the House. A total of 7.7 million tons of chemical products moved by barge last year.

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Head of a new committee on petrochemicals of the National Petroleum Council is Bruce K. Brown, formerly president of Petroleum Chemicals Inc. and a business consultant in New Orleans. The 19-man group will conduct an intensive study of the petrochemical field. Interior Secretary Stewart L. Udall named Thomas A. Peake of the Office of Oil and Gas as government co-chairman of the study group.

The inquiry will cover all chemicals—except carbon black, ammonia and synthetic rubber—manufactured in plants owned or operated by oil and gas companies or in petroleum plants. This will include jointly owned companies where 50% or more of the ownership is in the hands of petroleum or gas companies.

The National Petroleum Council is a government-appointed group of private citizens. Its chief job is to make studies of the oil and gas industry to determine if it is being maintained sufficiently to meet national defense needs in an emergency. The new committee will make such a defense-oriented study in the petrochemical area.

•

A federal research center will be established at Amarillo, Tex., by the Department of Interior. Reason for creating the new center, Secretary of Interior Stewart L. Udall says, is to explore new uses for helium, particularly for space exploration.

In the last few years the importance of helium has shifted from its original purpose as a lifting gas for lighter-than-air craft to missile and space uses. Scientists are experimenting with the liquid to increase the range and frequency of ultra-high-frequency communications radar and radio telescope uses. Another area being developed: use of liquid helium as a refrigerant for superconducting electromagnets.

The research program is part of the government's larger helium-conservation project. The Administration is urging private companies to build plants to separate helium from gases and sell the helium to the government for storage until needed. The Bureau of Mines estimates that a year's supply of helium is wasted every 45 days when natural gases are burned without extracting their helium values.

•

An international agreement on textiles, both production and export, will be sought by the Kennedy Administration. The pact, to include

Washington Newsletter

(Continued)

synthetics, would be an aftermath of President Kennedy's recent decision not to impose a quota system on textile imports.

The Administration has decided to seek cooperation from major textile producing and consuming countries to control the flow of goods. Talks are expected to begin within the next week or so. Although cotton textiles are the primary concern, any voluntary system worked out would include synthetic as well as natural commodities. The U.S. sees the plan as an experiment. If it works, it could pave the way for similar multilateral agreements on other light-manufacture goods.

•

The Administration's broadened fight against water pollution is well on the way to Congressional aproval. The House last week passed the bill sponsored by Rep. John A. Blatnik (D. Minn.). No serious opposition in the Senate is expected.

Chief changes: the program would be upgraded to special division status in the Dept. of Health, Education and Welfare (it now is under the Public Health Service); grants to state and interstate agencies for pollution-control programs would be increased from $3 million to $5 million/year; federal funds for municipal waste-treatment plants would be increased from $50-million/year to $100-million/year; federal enforcement authority would be extended to "navigable" water on request of state or local governments.

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Speeding of complaints through the Federal Trade Commission is the goal of an FTC reorganization plan being prepared by Chairman Paul Rand Dixon. Additional agency reorganization plans, including one perhaps for the Food and Drug Administration, are being prepared at the White House.

Dixon wants to rearrange FTC's operating bureaus along "major purpose" instead of "functional" lines. In this way, he hopes to reduce the number of hands through which complaints pass, allow one man or one bureau to follow a complaint through its various stages, and thus cut the time a company is left with a complaint hanging over it.

•

An intensive desalting research study will be conducted June 19 to July 14, at Woods Hole, Mass. Joint sponsors: the Dept. of Interior and the National Academy of Basic Study. Purpose: to study and propose avenues of basic research and recommend a program of accelerated research.

Meanwhile, the first of five federal saline water conversion demonstration plants has gone into operation at Freeport, Tex. After two months of testing, the demonstration plant will be turned over to the operator, Stearns-Roger (Denver). Product water will be sold in equal amounts to the city of Freeport and Dow Chemical Co. (*See also Technology Newsletter p. 68*).

BECCO ECHO

PUBLISHED BY BECCO CHEMICAL DIVISION Food Machinery and Chemical Corporation, New York 17, N.Y.

COLOR! Use bleach?

AT the moment you open your newly-developed color film, we know you couldn't care less about the procedure for developing those wonderful snapshots that you took. But, take a few moments to consider the quality-control program involved . . . and Becco's seemingly incongruous role in the developing process.

At Kodak Park, in Rochester, New York, Becco's Potassium Persulfate is used in developing color films. A little-known fact is that a bleach bath is an integral step in the production of the color image. A simple and economical chemical operation, replacing earlier expensive and space-consuming electrolytical equipment, takes place when Becco's Potassium Persulfate is added to the bleach used in the developing process. The bleach, used to convert silver to soluble form and thereby allowing the final "fix" bath to reveal the full color, must be rejuvenated at regular intervals. This is done by adding ferrocyanide and Becco's Potassium Persulfate to the bleach. Oxidation occurs, and the ferrocyanide becomes ferricyanide. The bleach is then ready for further use.

Kodak is one of many companies using Becco's Potassium Persulfate. Other companies in various industries, such as rubber, textile, and plastics, put our Potassium Persulfate to good use.

Becco Bulletin No. 11 gives the complete story of Potassium Persulfate, including its lists of properties, best handling and storage methods, and gives charts of its stability and solubility. It's yours for the asking . . . just write us on your letterhead, asking for it by number. Address: Dept. CW-61-10.

Colorama reproduced in Grand Central Station, New York in 60-foot by 18-foot size.

BECCO ECHO

No Fish Story Here!

MEN are natural exaggerators when they describe the results of their fishing trips. Let them catch a minnow, and they bring home a whale! Becco, on the other hand, bends over backwards to assure *accuracy* in the delivery of specified quantities of hydrogen peroxide to its customers.

Thoroughly cleaned and carefully inspected aluminum drums are placed singly on Howe or Toledo scales; the reading is set at zero. The drums are filled with filtered hydrogen peroxide until the scale shows the labelled shipping weight. Carboys are handled similarly. These scales are inspected monthly by representatives of the scale company to maintain accuracy.

At our Buffalo plant, a Howe Track Scale and Type Registering Weighbeam is used for weighing tank cars and tank trucks. In the case of a tank car, the vehicle is placed on the scale, weighed, and a record is made of the tare weight. Filtered hydrogen peroxide is pumped into the car until it is filled to the base of the dome. It is then inspected, since the load, if not filled to the exact height, can cause the car to oscillate dangerously when it is in motion. The car is sealed and weighed. The difference between the two readings is the weight of hydrogen peroxide in the tank car. Finally, Becco's accounting department and the railroad receive copies of the printed records. The scales used are inspected and tested four times a year, and no inaccuracies have ever been reported.

The weighing of tank trucks is handled with similar care to ensure accurate delivery, and a weight certificate is furnished to each customer.

So, the fishermen have their stories, and we have ours—and ne'er the twain shall meet!

MORE than a third of a century of experience shows! Ever since it was founded 36 years ago, Becco has devoted its time and energy to the manufacture of hydrogen peroxide and to research in its application. Today, Becco provides industry with 10 additional peroxygen chemicals based on electrolytically-produced hydrogen peroxide.

Becco serves many industries—textile, paper, plasticizers, cosmetics, metal finishing, and is even doing its share in the fields of missile guidance and propulsion. The broadened use of peroxygen chemicals owes much of its present state to Becco's Research and Development staff which continuously studies customers' needs in an effort to keep pace with today's—and tomorrow's—world.

The technical "know-how" of our chemists, engineers, and technical fieldmen is available to you. Their experience has been condensed in a series of technical bulletins. A few are listed at right. If you find any of interest, just drop us a line on your letterhead and ask for the ones you want by number. We'll be happy to oblige.

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Properties, Reactions, etc.

24. ANALYSIS OF ALIPHATIC PERACIDS
34. USES OF PERSULFATES A BIBLIOGRAPHY—PART I
40. EQUIPMENT FOR USE WITH HIGH-STRENGTH HYDROGEN PEROXIDE
55. STABILITY OF PURE HYDROGEN PEROXIDE
59. THE ANALYSIS OF H_2O_2 SOLUTIONS
62. HYDROGEN PEROXIDE VAPOR
68. USES OF PERSULFATES A BIBLIOGRAPHY—PART II
87. THE BEHAVIOR OF THE GLASS ELECTRODE IN HYDROGEN PEROXIDE SOLUTIONS
93. ANHYDROUS HYDROGEN PEROXIDE AS A PROPELLANT

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Growing Export: Technical Service

In their fight for international chemical markets, U.S. producers are exporting a proved selling tool—technical service.

As their exports and overseas manufacturing operations grow, U.S. chemical companies are finding that their foreign customers demand more and more service for their purchasing dollar. To meet these demands and to counter the intensifying competition from local producers, U.S. firms have had to match the service offered by their foreign competitors.

These new developments underscore the trend: Union Carbide's European affiliate, Union Carbide Europa, S.A., plans to open its plastics service lab in Geneva, Switzerland, next month. USI's Swiss technical service lab and office will be completed in Zug by late August or early September.

Starting this month, the international division of Spencer Chemical will take over the marketing responsibilities from its overseas agent. It has been gradually assuming more control since its formation just two years ago. With more centralized operations, Spencer can now give more attention to servicing its international accounts.

Goodyear's international chemicals division is experimenting with locally available labs on a consulting basis. This system is being tried for a year—just about up—then Goodyear will weigh this plan against building its own facilities.

Currently the Dewey and Almy Division of W. R. Grace is operating a Plastics Technical Center in Milan, Italy. This is a talent pool composed of Europeans available for consultation chiefly on flexible packaging programs anywhere in Europe. Dewey and Almy might set up similar groups in other areas of the world.

Hercules Powder, though it hasn't expanded overseas operations appreciably in five years, hopes to add a technical service laboratory in Holland sometime in the future. Hercules now handles most service problems at its labs in England and the U.S. Pennsalt plans to upgrade its service operations through a partnership recently formed with Fabriek van Chemische Producten Vondelingenplaat (Vlaardingen, Holland).

Overseas Agents: Besides, or often instead of, having their own labs, many U.S. chemical firms depend on overseas agents' facilities for handling customers' problems. Atlas Powder, for example, used to send men abroad to customers' plants. Now it relies more on its subsidiaries and distributors. It still sends someone from the home plant (Wilmington, Del.) in emergencies, or to introduce new products or improved manufacturing techniques.

Like many companies that work through agents, Atlas brings these representatives to the U.S. periodically to demonstrate new developments. Seven technical servicemen from its overseas associates recently completed a five-week training course in product technology and applications at the Wilmington plant. Several staff members of Atlas' new (less than two years old) international division also participated. And language proved no barrier—a working knowledge of English was considered a prerequisite for the course.

One typical company lets its distributors service all the problems for which they are equipped. If help is needed, the firm's international division forwards the request to whatever domestic division is involved. It often finds many general queries can be solved by mail.

Dow works much the same way when additional help is needed for its men stationed abroad. If a consultant has to be sent overseas, the international division pays his fare and living expenses, but the domestic division involved pays his salary.

Another Eastern chemical producer keeps its distributors up to date by holding periodic conferences abroad. Then it sends U.S. men over to deliver papers on new products and operations. Occasionally the agents are brought to this country, but the local meetings are considered more convenient when many people are involved. "Most of the distributors make annual visits to the U.S. anyway," reports a company spokesman.

U.S. Men Overseas: One question facing U.S. companies that service their own customers abroad: Should representatives be stationed abroad permanently, sent periodically, or just on demand? Of the companies CHEMICAL WEEK queried on this particular point, only two wait for specific requests before sending out technical servicemen. Six send men on periodic jaunts (four to eight weeks), six have men stationed semipermanently (usually two years at a time), and five have some combination of these.

Armour Industrial Chemical, whose overseas technical service operations have tripled in the past five years, sends its men abroad for only short periods. An alternating team arrangement lets them work two months abroad and 10 at home. Their U.S. assignments are usually other than technical service.

Pennsalt, on the other hand, uses regular U.S. technical servicemen for overseas customers. The men go abroad on request and also on special assignments, while their stateside work is temporarily taken over by other personnel.

Dow declares that if service representatives make more than four annual trips abroad, it's usually cheaper to station them there semipermanently. In addition to the customer servicemen, Dow also sends men out on a two-year "project basis." These staffers train local men to handle service problems. It's in line with the trend, now gaining wider acceptance, of replacing the U.S. men abroad with local nationals—a move Dow itself got into just last year.

Local Nationals: The majority of the technical servicemen working for Cyanamid International, division of American Cyanamid, are citizens of the country where they work. For the mining chemicals, Formica and gen-

(Advertisement)

New, Lighter Colored Dimer Acid

A new dimer acid with substantial improvements in color and color stability has been developed by Emery Industries, Inc. Empol® 1018 has an 8 maximum Gardner color compared to an 11 maximum for standard commercial Empol 1022. Color stability of the new dimer is outstanding — typically 8+ Gardner after one hour at 205°C in an open test tube.

Composition

Empol 1018 has a typical composition of 83% dimer acid (C_{36} aliphatic dicaboxylic) and 17% trimer (C_{54} tricarboxylic). Only a trace of monobasic acids are present, with specifications listing 1% maximum. Empol 1018 is not only lighter-colored than Empol 1022, but also has less monobasic and trimer acids, which may affect cross-linking, viscosity and gellation of its derivatives.

Applications

With its light color and low monobasic properties, Empol 1018 will find excellent application in polymers such as polyesters, polyamides, esters, ester-based urethanes, varnishes, epoxy ester coatings and other uses where its light color is valuable.

Advantages of Dimer

The combination of long chain length and high molecular weight of dimer acid gives it characteristics uniquely its own. Its alkaline soaps are excellent emulsifiers, and the free acid is the basis of a number of anti-rusting compounds.

In polymers, it tends to increase flexibility. The appreciable amount of trimer acid present in Empol 1018 can form a considerable amount of cross-linkages, yielding polymers with good toughness and alkali resistance. Through-dry of long-oil alkyds and epoxy ester varnishes is also speeded by dimer acid.

Readily Available—Moderate Price

Empol 1018 is made from domestic raw materials and is available for immediate shipment in tankcars or drums. Although it enjoys both color and low-monobasic advantages over Empol 1022, it sells for only 1¢ a pound more at 26¼¢ in tankcar quantities, East of the Mississippi.

Descriptive Literature

For complete description and specifications of Empol 1018 Dimer Acid, request Bulletin 421. Write Emery Industries, Inc., Dept. I-5A Carew Tower, Cincinnati 2, Ohio.

eral chemicals departments, six U.S. men are based abroad, five go over periodically, while 50 local nationals are now employed. These men are trained either at Cyanamid plants in the U.S. or by senior men in the areas where they work. In the agricultural department, almost all the 150 servicemen are local nationals, working either for Cyanamid subsidiaries or distributors.

Borden Chemical backs up this effort to use local men wherever possible—only about 1% of its technical representatives abroad are from the U.S. And, consistent with an increasingly popular CPI practice, the men are supplied with technical literature translated by people in each particular country.

Dewey and Almy points out that nearly all its permanent overseas technical servicemen—a half-dozen five years ago, 85 today—are employed in their own countries. Possible exceptions: U.S. men sent on special assignments. In this count the company includes all personnel furthering overseas sales, whether in manufacturing, sales or research, in its technical service category.

All these men come to the U.S. for a training period, and return occasionally for refreshers. In addition they are in contact with traveling U.S.-based specialists. D&A reports it spent nearly 2,000 man-days on U.S. training last year.

One company makes a special effort to keep what it terms the "American taint" out of its overseas operations, all of which involve foreign partners. Americans are rarely in evidence. This company sends two or three of its own men to other countries occasionally, but tries to tie this in with trade meetings or conventions. The U.S. men who do visit the jointly owned foreign companies are not regular technical servicemen anyway, but are usually product managers or staff personnel with consulting as a sideline.

This approach has its advantages. Most CPI firms either exporting or manufacturing abroad report the biggest competition comes from the local producers, at least in the more industrialized nations. By keeping the U.S. associations subdued, this company finds it easier to convince buyers that it is actually a locally controlled operation.

Outlook: Although exporting and overseas manufacturing are almost as old as the CPI itself, many companies are just now getting around to developing formal international divisions or customer service operations. For example, out of 26 chemical producers answering *CW*'s survey, 15 had organized their international divisions or initiated technical service abroad within the past five years, 10 of these in the past two or three years.

U.S. chemical companies are at an immediate disadvantage fighting overseas producers in their own countries. But the application of proved selling methods—such as better customer service—plus an attempt to understand the customs, culture, history and languages of the areas served are major steps toward expanding the CPI's markets abroad.

New Sales-Seeker

Aiming to increase markets for chemicals, especially plastics, in building construction, Allied Chemical is currently organizing a formal Commercial Development Dept. in its Barrett Division. Barrett is Allied's building materials producer; the new department is set up not only to help expand markets for current products but also to suggest new items and evaluate potential acquisitions.

Although Barrett has long made use of the other divisions' products and concerned itself with possible applications in the building industry, its new group is the first formally organized for this purpose. The department will analyze market possibilities in the paving as well as the construction products industries.

Predicts Barrett President Dorn Stewart, "Nearly one-third of materials used for building homes in the '70s will have been born in test tubes." And hopefully these will be Allied test tubes. All of Allied's divisions stand to share in this development—e.g., Barrett produces rigid urethane foam with isocyanates from the National Aniline Division and polyethers from the Solvay Division.

As currently evaluated, the most likely building outlets for increased plastics production include polyethylene cold water piping, urethane foam insulation, plastic building panels, sewer pipes, gutters, flashings and leaders, Stewart says.

Model 3195 centrifugal pump

WHY THIS DUCTILE IRON PUMP HITS 500°F...WITHOUT RISK...WITH LESS COST

Now you can pump liquids as hot as 500° F, low-specific-gravity hydrocarbons and other tough services at working pressures to 275 PSIG without the extra cost of carbon steel.

Ductile Iron resists stress, impact and high pressure as much as carbon steel does—because it has properties similar to carbon steel's.

	Tensile Strength	Yield Strength	Elon-gation	Notes
Cast Iron A48-56	30,000 PSI	0	0	
Goulds Ductile Iron (ASTM A395-56T)	60,000 to 70,000 PSI	45,000 to 50,000 PSI	15-25%	As heat treated to full ferritized anneal
Carbon Steel ASTM A-216-59T-WCB	70,000 PSI	36,000 PSI	22%	

3 Tests Prove Your Pump's Toughness. Each heat of Ductile Iron goes through three rigorous tests—physical, chemical and microscopic.

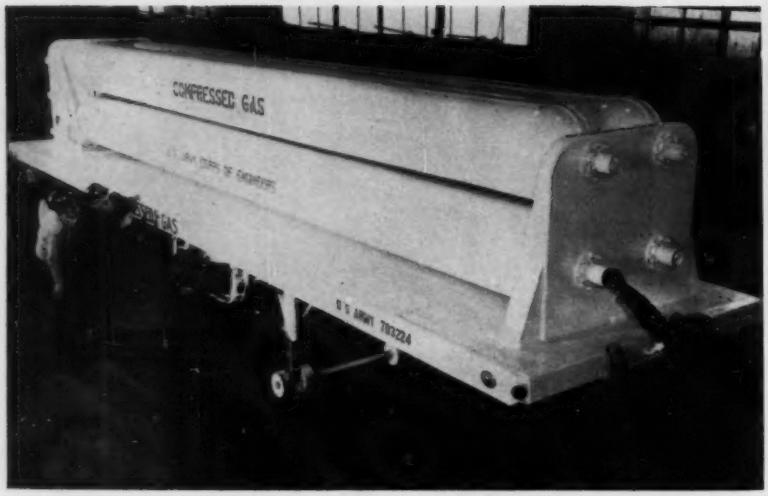
We break and twist test bars to make sure tensile strength and elongation conform to ASTM-A395-56T specs. We run a chemical analysis to assure the right base chemistry. Microscopic analysis tests for spheroid structure of graphite and completeness of ferritization.

You can get information covering each heat and all castings poured from it. Or we can make tests to your specs.

There's a big story on the Goulds Model 3195, available "off the shelf" in Ductile Iron. Ductile Iron compares to carbon steel in ductility, impact resistance and resistance to thermal shock. Costs less. Both pumping units and pump parts are highly interchangeable. It's available in Ductile-Ni-Resist when corrosion is a factor. Bulletin 725.1 can fill you in with all the details—dimensional interchangeability, bearing frame selection chart, pressure-temperature chart and other helpful information.

Just write Goulds Pumps, Inc., Dept. CW-51, Seneca Falls, New York.

GOULDS PUMPS



New cylinders offer bigger payload, less downtime for checkups.

More Payload per Haul

New, large-capacity compressed gas containers developed by National Tube Division of U. S. Steel, are now offering truck cylinder haulers increased payloads and less deadload per trip.

The new units, containing four cylinders 24 in. in outside diameter and 28 ft. long, are equal in capacity to almost 34 of the conventional 9⅝-in. by 21-ft. tanks. The first units will be used to carry helium and nitrogen to six Air Force missile bases, but they are designed to hold oxygen, hydrogen and anhydrous hydrogen chloride as well.

Aside from extra capacity, the new tanks will likely offer less off-the-road downtime for ICC inspections. Government and ICC regulations require that each compressed gas cylinder undergo hydrostatic testing every five years. With fewer cylinders, and a redesigned mounting rig, less time should be consumed disassembling, testing and remounting each unit.

The special cylinders, developed at National Tube's Christy Park Works, are formed by rolling large high-pressure seamless pipe and hammering down the ends to form closures.

Special Permits: Before the large cylinders were cleared for truck hauling, a special exemption had to be sought from ICC. Current regulations limit truck-carried compressed gas cylinders to a capacity equivalent to 1,000 lbs. of water. The new cylinders have capacity for 4,650 lbs. of water. Until the regulation is changed, each potential user will have to file for special permission from ICC, although U.S. Steel says this is just a formality now that a "test case" has been approved.

The large cylinders are designed so that four can be mounted as a unit on a variety of standard flat-bed trailers. This unit weighs 17,488 lbs., compared with 19,604 lbs. for 34 of the smaller tanks. Since the first units were designed to carry gases for complex missile systems, the inside surfaces had to meet these minimum requirements: no particles larger than 150 microns, nor more than 10 ppm. solid particles nor more than 72 ppm. total hydrocarbons (dirt and grease).

A dew point of not less than —60 F is required for a 15-psi. filling of gaseous nitrogen for preservation of cleanliness.

Specifications for these first redesigned cylinders were proposed by the Corps of Engineers, which then worked with U.S. Steel and ICC.

The trailer illustrated allows even more weight saving with two "J" rail frames. These run the length of the trailer and serve as the main supporting members.

An extra measure of service—
always—
when you buy from Eastman

Eastman Plasticizers

dibutyl sebacate
dimethyl phthalate
diethyl phthalate
di-(methoxyethyl) phthalate
di-isobutyl phthalate
dibutyl phthalate
dioctyl phthalate (DOP)
dioctyl isophthalate (DOIP)
dioctyl adipate (DOA)
dioctyl azelate (DOZ)
plasticizer 84
—an octyl butyl phthalate
polymeric plasticizer NP-10
triacetin
tributyrin

For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog,** page 363, or **Chemical Week Buyers' Guide,** page 107.

Eastman

What happens when you buy from Eastman!

"I suggested that the customer had ordered more plasticizer than he needed"

...writes our New England office's girl Friday. "But what else can you do when three days after shipping 4,000 gallons of DOP you receive from him a second purchase order for immediate shipment of another 4,000 gallons of DOP, especially when you know from past service to this customer that the second order is out of line with his purchase pattern—relax and enjoy the increased business, or stick your intuitive nose into his business?

"Well, first I went over his order form again to be absolutely certain that it was correctly entered, then throwing the old maxim that *the customer is always right* to the wind, I got his purchasing agent on the phone.

"Now, who ever says purchasing agents, by and large, can be a stern lot, hasn't talked to this one. Turned out it was an error—a double-up order for which he had neither immediate use nor storage capacity. Upon his advice I post-dated the order three weeks and thanked him for his very kind words about our service.

"Is this an example of the kind of service we talk about in our ads?"

It sure is! For the best service is made up of close attention to the customer's needs, whether they are large or small, and this, of course, includes anticipating the material he requires as well as the material he does not require.

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SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, North Carolina; Houston; Kansas City, Missouri; New York City; Philadelphia; St. Louis.
Western Sales Representative: Wilson & Geo. Meyer & Company, San Francisco; Los Angeles; Salt Lake City; Seattle.

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Users, coast-to-coast, in a wide variety of industries, have learned that they can always depend on uniformly superior quality when they specify "Mississippi". By standardizing on Mississippi products you can eliminate uncertainty where lime is used and open the way to improved processes.

No matter what your needs for lime may be, we believe that you'll discover that "Mississippi" can meet them exactly. Our skilled technicians are at your service for consultation with your technical staff. See our specifications in Chemical Materials Catalog.

**Mississippi Lime Company's entire limestone deposits have a natural purity and uniformity unequalled in such quantity anywhere. The entire formation tests 99% pure calcium carbonate.*

Immediate shipment in *any quantity anywhere*, BY BARGE... BY RAIL... BY TRUCK

MISSISSIPPI LIME COMPANY

ALTON ILLINOIS

DATA DIGEST

- **Toluidine Safety:** Data sheet (SD-82) lists properties and essential information for safe handling and use of toluidine. Manufacturing Chemists' Assn., Inc. (1825 Connecticut Ave., N.W., Washington 9, D.C.).
- **Acrylic Sizer:** Technical bulletin (T-6c) describes alkali-soluble acrylic copolymer for textile sizing. Physical properties and application methods are outlined. Polyvinyl Chemicals, Inc., c/o Creamer, Trowbridge & Case (198 Dyer St., Providence, R.I.).
- **Food Emulsifiers:** New, 12-page catalog outlines applications and regulations concerning permissible usage levels for food emulsifiers. Glyco Chemicals (417 5th Ave., New York 16).
- **Chlorinated Naphthalenes:** New bulletin (T-203) describes solubility and compatibility of chlorinated naphthalenes with other materials. Suggested uses: flameproofing compounds and binders for the glass, ceramic and powder metallurgy industries. Tar Products Division, Koppers Co., Inc. (Koppers Bldg., Pittsburgh 19, Pa.).
- **Morpholine:** Technical brochure includes data on sales specifications, analytical procedures, handling and storage, physical and chemical properties of morpholine. Suggested uses: rubber chemical intermediate, corrosion inhibitor in steam boiler systems and as separating agent for volatile amines. Jefferson Chemical Co., Inc. (1121 Walker Ave., Houston 2, Tex.).
- **Asbestos-Resin Laminate:** Data sheet lists mechanical properties and available forms of heat-resistant asbestos woven fabric bonded with a high-temperature phenolic resin. Synthane Corp. (Oaks, Pa.).
- **SMA Resins:** New brochure describes chemical and physical properties and potential applications of a new series of styrene-maleic anhydride copolymers. Polychemicals Dept., Texas Butadiene & Chemical Corp. (529 Fifth Ave., New York 17).
- **Alum:** Comprehensive 40-page reference handbook includes data on the manufacture of aluminum sulfate, grades available, principal uses and methods of handling. Specifications are listed for water and sewage treatment in accordance with government standards and the American Water Works Assn. Stauffer Chemical Co. (380 Madison Ave., New York 17).

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DRY-FLO® CHEM CAR!

PNEUMATIC UNLOADING NOZZLE FOR DRY-FLO CHEM CAR

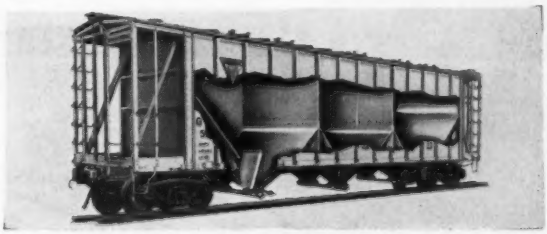
Designed especially for dependable, safe bulk shipment of polyethylene, polystyrene, polypropylene and similar chemicals in dry form.

The new 3,500 cu. ft. capacity Dry-Flo Chem Car was developed for the chemical industry to provide a car which would assure freedom from contamination and moisture pick-up while in transit and during unloading.

The car is welded throughout, has fully-gasketed openings, unloading nozzles (created especially for pneumatic unloading) designed for fast disassembly–speedy and complete cleaning. Also the car is divided into three separate compartments.

Illustrated is a schematic view of the new, exclusive General American unloading nozzle. Unloading flow can be controlled to accommodate individual unloading systems. Three outlets are provided on each car, thus requiring fewer connections and adjustments, minimizing the possibility of contamination.

275 of these cars are already in service or on order. If you would like further information on the Dry-Flo Chem Car, write to . . .



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Stauffer Features

STAN MUSIAL AND US!

Each Time We Appear It Becomes a Record

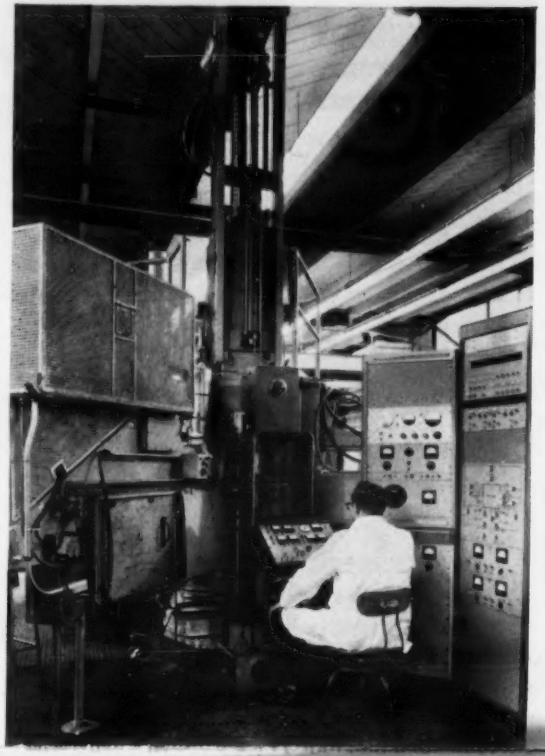
The Metals Division of Stauffer Chemical Company is truly a power in the development of the electron beam furnace and the techniques for using it. Like Stan Musial—after all his great years, though ours are fewer—we are making new records daily. The Metals Division has now made the most electron beam furnaces for the production of ultra-high-pure refractory metals and the biggest furnace ever developed for the purpose.

What is the purpose? The purpose is to make pure refractory metals and pure refractory alloys which have the extraordinary properties characteristic of pure substances. For example, ordinary iron has a tensile strength of 30,000 to 40,000 psi. *Pure* iron of crystal growth has a tensile strength in the area of 1,000,000 psi.

Anyway, we just put the world's largest electron beam furnace on the production line at the Metals Division plant in Richmond, Calif. From this you get billets as big as 8 inches in diameter and 42 inches long, the optimum size for rolling and casting.

The new biggest-of-all electron beam furnace is rated at 300 kw. It will knock out 20,000 pounds a month of high-purity tungsten, tantalum, columbium and other "ums" and their alloys.

It appears we are stuck with high-purity metals and such, but we're not alone! Union Carbide Corporation just bought one of these 300 kw jobs. It operates at temperatures exceeding 6000°F and at vacuums as high as 10^{-4}mm.Hg. This is 0.0001 of a millimeter of mercury and a very low pressure if you're asking us. You aren't, to be sure, but if you wish to, please write us. So . . . onward and upward with Stan the Man.



MAN vs INSECT IN THE FIGHT FOR COTTON

You'd be amazed at the pests that attack cotton in the field! Boll weevil, cotton aphid, fleahoppers, leafworm, spider mite, lygus bugs and thrips are a few of the insect world that would—in their insatiable ignorance and hunger—deprive us of cotton.

Stauffer has a new pesticide—METHYL TRITHION(TM)—which is used in combination with DDT to defend us against all these pests! When we say "new" we don't mean it was invented yesterday! All pesticides are subject to rigid governmental control. This *new* Stauffer product has been tested for *years!* It has now become an authorized member of the armamentarium which defends mankind against the insect world and if you think that's simple, you just haven't been around. There is no greater war than that between mankind and the insects. They might even win!

The National Agricultural Chemicals Association has calculated that a pair of flies—male and female, need we say?—starting in April and unchecked until August could produce enough progeny to cover the entire earth 47 feet deep! This tells you why Stauffer agricultural chemicals are a substantial contribution to human existence.

If you need protection for your crops there are lots of places where you can get Stauffer chemicals. Eleven Stauffer agricultural sales offices, about 200 distributors and 10,000 or more dealers stand ready with Stauffer's tested chemicals and sage advice on how best to use them.

Stauffer Establishes Academic Awards at University of Illinois

Three undergraduate scholarships and one graduate fellowship have been established by Stauffer Chemical Company with the Department of Chemistry and Chemical Engineering, University of Illinois. Each scholarship will have a value of $1,000 annually and the fellowship will furnish $3,000 to the fellow and the University.

The scholarships and fellowship are in memory of the late August Kochs, former Chairman of Victor Chemical Works and Vice-Chairman of the Board, Stauffer Chemical Company. The first of the August Kochs Scholarships and Fellowship will be awarded for the 1961-1962 academic year.

"There are Hotter Things in Heaven and Earth, Horatio" than Summer Heat

When you want to forget about summer heat, change your frame of reference. Start thinking about rocket nozzles and the fantastic temperatures of modern rocket fuels. Most materials used in rocket nozzles melt down, burn away or are just plain eroded by the blasts. Now comes a solution for the problem.

Stauffer's tantalum and columbium pentachlorides are being used in pyrolysis reaction with a hydrocarbon—methane for example—to deposit a coating of tantalum or columbium carbide on the exposed graphite surface. Interestingly enough, these compounds have higher melting points than the pure metals. Tests show average figures of 3800°C (nearly 6900°F) for tantalum carbide and 3500°C (over 6300°F) for the columbium carbide. And that gives the necessary resistance to heat!

FEEL COOLER NOW?

The machine tool industry is also taking advantage of this characteristic of refractory carbides to improve cutting tools. The carbides are used as additives to titanium carbide and the compound added to tungsten carbide to eliminate cratering and improve wear resistance of the finished tool.

Stauffer FOR MORE INFORMATION Stauffer

Please write on your company letterhead for technical bulletins on electron beam furnaces, high-purity refractory metals and alloys, refractory carbides and METHYL TRITHION. Stauffer Chemical Company, 380 Madison Avenue, New York 17, N. Y.

FILMS made with Pro-fax polypropylene are strong and tough. They provide attractive crystal-clear packaging that is highly resistant to grease, moisture, heat, and to many chemicals.

Pro-fax is heat-sealable and cementable. Highly resistant to fatty foods, Pro-fax films are adaptable to hot-filling, can be sterilized safely at temperatures up to 275°F.

The outstanding strength properties and low specific gravity of films made with Pro-fax permit substantial cost savings through greater coverage by weight. They can be handled on conventional packaging equipment designed for polyethylene. In many instances cellophane equipment will process these films equally well.

Pro-fax films provide a superior, low-cost container barrier, *FDA-approved for food use.* Ask a Hercules packaging specialist for help in adapting Pro-fax films to your requirements. Call or write:

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CP61-2R

Not-So-Rare Earths Take Aim on New Uses

After a long period of intensive research, a number of new, large-scale uses for rare-earth materials are now within sight, although still just out of commercial reach. Use of rare earths in steel alloying and plate glass polishing are among the biggest potential markets. And nonferrous alloys, nuclear uses, thermoelectric materials and catalysts are also on the list of hopeful applications.

If these markets should open up, the current rare-earth industry sales of about $6 million will probably multiply 10-fold in the next five to 10 years. And a conservative estimate of 10-20% growth in the next two to five years is made on the basis of the slow but steady growth in the field over the past three years, after many years of static markets. Enough current research projects are reasonably certain to pay off and assure at least this modest rate of growth.

Biggest achievement of the past few years has been development of high-purity rare-earth metals (99% and higher) and extension of purity limits on the compounds. Lindsay Chemical Division (West Chicago, Ill.) of American Potash & Chemical Corp., for instance, recently introduced developmental quantities of 99.9999%-pure yttrium oxide for electronic research in yttrium-iron garnets.

New separation and purification techniques have enabled closer examination of the properties of the individual rare earths as well as selection of a specific element with desired properties. For nuclear applications, for instance, the cross-sections of rare earths vary from 0.7 barns (cerium) to 46,000 barns (gadolinium). Similar differences in other properties are noted once the metal is pure enough. And purification is also the key to transforming most of the rare earths from hard, brittle metals to ductile, easily formed ones.

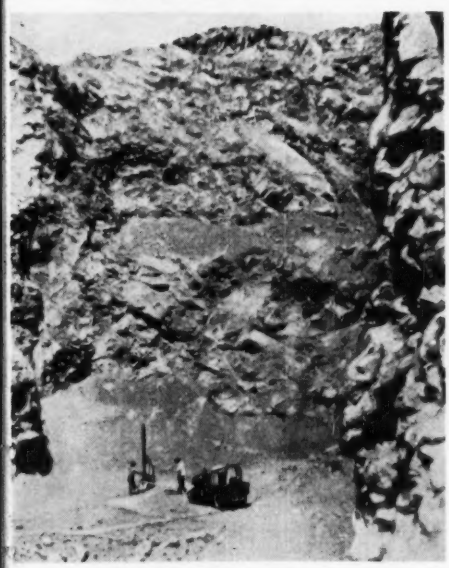
Just Around the Corner? Plate glass polishing and steel alloying are the two biggest potential uses for the rare earths (*see table, p. 60*). Widely used in many special polishing operations, rare-earth oxides (principally cerium oxide) would get a big boost if adopted by the plate glass industry. This application is experimental; attention centers on getting pressure requirements down to levels that plate glass can withstand.

Long a target of rare-earth marketers, the steel industry has not yet adopted these materials as standard alloying ingredients. But hopes are still high that continued research with new, high-purity materials will lead to a reproducible formula for obtaining a desired property (e.g., better workability, oxidation resistance) by including an economically justifiable amount of rare earth. Reduction of inclusions in the steel formed by reaction of the rare earth with oxygen, nitrogen or silica is a problem.

Use in nonferrous alloys is also a key target. Adoption as a hardener for magnesium-aluminum alloys would be a big step for the rare earths. And they can help to improve the ductility of other metals, such as vanadium and brass. (They are used in making ductile nodular iron.)

In the nuclear field, choice of the proper rare earth or a careful blend of more than one can give a wide variety of specified nuclear absorption properties and densities. Michigan Chemical Corp. (St. Louis, Mich.) offers products that include a shielding coating that can be sprayed or brushed and a mixture of densified gadolinium and samarium oxides for reactor use. The company recently agreed to work exclusively with Haveg Industries in

DIMENSION



Yawning Mine Belies Rare Earths' Rareness

Not as rare as their name indicates, the rare-earth metals can be obtained in quantities far above present needs from monazite ore (most commonly used ore) or bastnasite (shown, **left**, in one of the many open faces at Molybdenum Corp. of America's huge Mountain Pass, Calif., mine). Generally included in the group are elements 57-71 (the lanthanide series), plus yttrium, element 39, which is similar to the former.

Most common of the group are cerium, yttrium and neodymium. Others found in reasonably large quantities are lanthanum, praseodymium, samarium, gadolinium, dysprosium, erbium and ytterbium. Promethium, with no stable isotopes, is not found in nature. The remaining members are europium, terbium, holmium, thulium and lutetium.

Because of the similar properties of the rare earths, they have generally been utilized in mixture form. Misch metal, the commonest form, consists of about 52% cerium, 18% neodymium, 5% praseodymium, 1% samarium and 24% lanthanum and other rare earths. Didymium, a mixture once thought to be an element, is 78% neodymium, 15% praseodymium, 2% samarium, 1% cerium and 4% lanthanum and other rare earths. Oxides, halides and other compounds of the rare earths are also often used.

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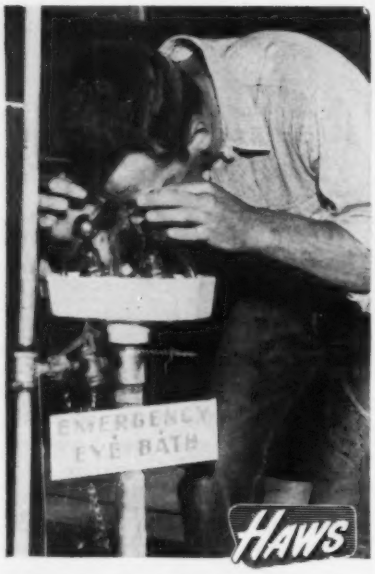

CONTAMINATED EYES SAVED

A Haws Eye-Wash Fountain instantly sends soothing water into injured eyes to wash away volatile fuels and acids. Accidents happen—but you can prevent serious damage. Write today for Haws fully detailed safety catalog. HAWS DRINKING FAUCET CO., *Fourth & Page Streets, Berkeley 10, California.*

developing plastic shielding materials (*CW, March 4, p. 73*).

Thermoelectric materials based on rare earths are also under close study. Gadolinium selenide has been the subject of considerable work, and Westinghouse has found that the sulfides of samarium and cerium can yield thermoelectric materials that are useful up to 2000 F (*CW, March 25, p. 58*).

Catalyst and magnetic uses are among the other fields that appear promising for the rare earths.

Separation Problems: Known for many years and sold for the most part as mixtures, the rare earths have had several hurdles to overcome before meriting consideration for large-scale commercial use. First was the technical problem of separating the elements, which have similar properties (especially in aqueous systems, where they form similar hydrates).

Cerium, the most abundant member of the family, is also the simplest to separate because it can be oxidized to a higher valence and is easily removed. The remaining mixed rare-earth compounds (often called "non-classical" didymium; the "classical" material is a mixture that is mostly neodymium and praseodymium) are more difficult to separate. Lanthanum salts can be separated by fractional crystallization, but the remaining elements require time-consuming batch ion-exchange processes for separation.

One of the biggest research projects connected with separation of the rare earths is the study of continuous solvent extraction methods, being carried on in many laboratories. Several different systems have been proposed. The University of Kentucky's separation of rare-earth acetylacetonates in buffered acetylacetone solutions shows promise. Application of a solvent extraction system, however, would probably require a larger production rate than is now feasible.

Once separated, the rare-earth compound (usually a halide) can be reduced to the metal by electrolysis or reduction with other metals (usually calcium). Most commercial rare-earth metals are produced by electrolysis, but the high-purity metals require metal reduction.

Who's Involved: Considering the size of the market, quite a few firms are involved in commercializing the rare earths, and a number of other

Rare-Earth Research Aims at Big New Markets

To a host of steady but small uses . . .

- **Lighter flints**
- **Toy sparklers**
- **Tracer bullets**
- **Luminescent shells**
- **Carbon arc lights**
- **Fluorescent lighting activators**
- **Rock polishing**
- **Metal soaps**
- **Motion-sickness remedies**
- **Textile mildewproofing, waterproofing**
- **Ceramic stains**
- **Ferromagnetic materials**
- **Electron-tube filaments**
- **Optical glass polishing**
- **Glass coloring and decolorizing**
- **Ultraviolet-opaque glass**
- **Porcelain enamel additives**
- **Camera lenses**
- **Ductile iron**

. . . rare-earth producers want to add a few big ones

- **Stainless steel additives to improve workability**
- **Nonferrous master alloys (e.g., with magnesium, aluminum)**
- **Nuclear shielding and moderating materials**
- **Ductility improvers in various alloys (e.g., vanadium, brass)**
- **Plate glass polishing**

laboratories (many financed by government contracts) are studying them. Companies that process the ores and offer rare-earth compounds include W. R. Grace's Davison Chemical Division (Pompton Plains, N. J.), Vitro Chemical Co. (Chattanooga, Tenn.), Molybdenum Corp. of America (Pittsburgh), Michigan Chemical and American Potash.

Michigan and American Potash (Lindsay) also make the high-purity metals, as do Lunex Co. (Pleasant Valley, Ia.) and Research Chemicals Division (Burbank, Calif.) of Nuclear Corp. of America. Misch metal and commercial grades of rare-earth metals are produced by Ronson Metals Corp. (Woodbridge, N. J.), Mallinckrodt Chemical Works (St. Louis, Mo.) and American Metallurgical Products Co. (Pittsburgh).

Union Carbide Metals Co., General Electric and Westinghouse are also actively researching rare-earth uses, as are Pennsylvania State University, Ames Laboratories at Iowa State University, the Atomic Energy Commission, the Bureau of Mines, Franklin Institute Laboratories, Armour Research Foundation and Georgia Institute of Technology. A broad study of rare-earth properties is being carried on at Battelle Memorial Institute, sponsored by seven companies.

Economic Hurdle: Solution of technical problems isn't enough, however, since the finished products come up against severe economic problems. Current prices for purified materials range from a low of about $6/lb. (for cerium oxide) to over $1,000/lb. (for some of the less common metals). These levels often frighten away potential users who might find, upon investigation, that the rare earths would turn out to be competitive with other materials, considering the quantity needed.

Abundance, for most of the metals, is no problem. As a group, the rare earths are more abundant than copper, and cerium alone is more common than tin. Separation problems have been at the heart of the economic problems, both by adding to the cost and by retarding market development until recent years.

The rate at which the rare earths will grow is an unanswered question, but the current extensive research activity is a guarantee that they will grow.

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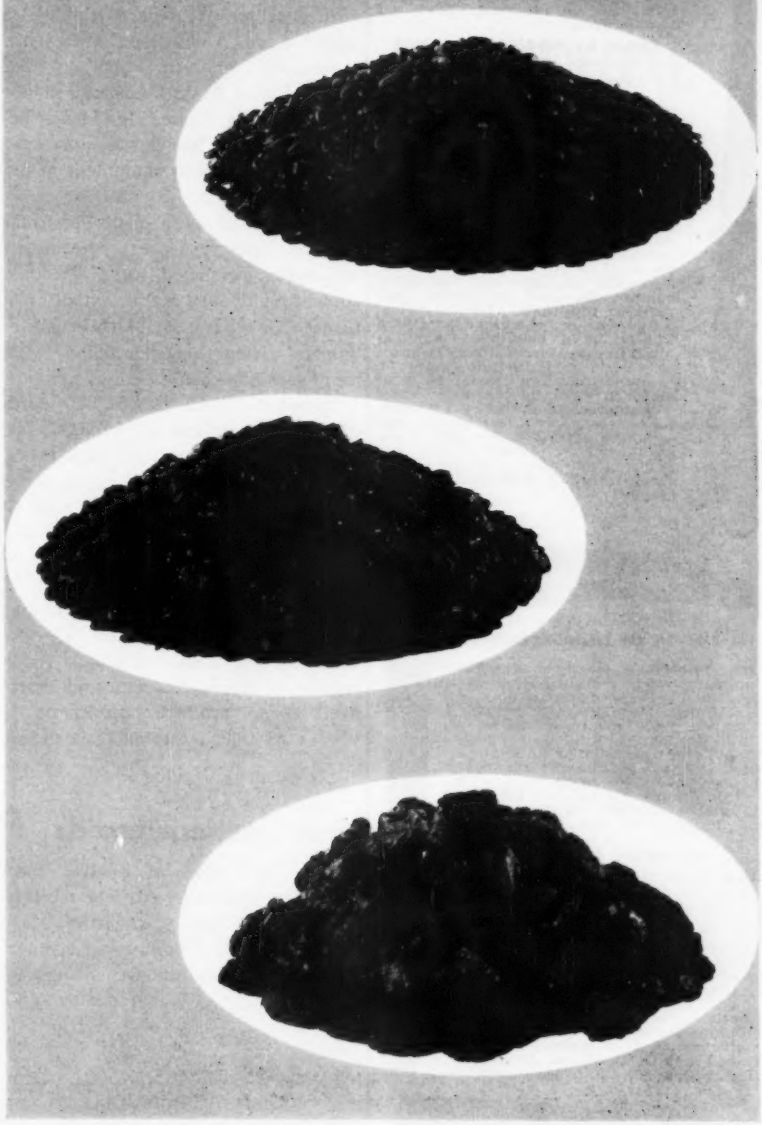

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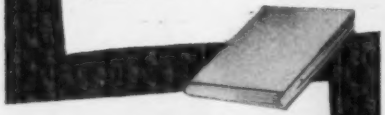
General Electric Company

Here—in a new, improved edition of this classic reference—are the most-used facts and data in chemistry, chemical engineering, and related fields. Over 1900 pages of information, much of it in handy tabular form, bring you fast, reliable answers to scores of on-the-job questions. You will find in the Handbook convenient access to data on the chemical and physical properties of elements, minerals, organic and inorganic compounds, and industrial materials, together with practical guidance on chemical analysis. Tables have been carefully revised in line with today's practice . . . and include facts on composition and properties of plain carbon and low-alloy steel — solders and fluxes — luminescence — polarography — heat capacity standards — and more. An extensive index helps you find and use data with speed and ease. **10th Ed. 1969 pp., 5½ x 8, $11.00**



HANDBOOK OF FLUID DYNAMICS

Just Published. Ready means for handling modern fluid flow problems are presented in this master Handbook. More than 30 experts cover a wide range of topics—fluid properties, fluid-flow equations, one-dimensional flow, two-phase flow, sedimentation, turbomachinery, jet propulsion, and many others. **Editor-in-Chief, V. L. Streeter, Univ. of Mich. 1240 pp., 901 illus. & tbls., $24.00**

POLYMERIC MATERIALS

Just Published. Provides broad coverage of basic polymeric materials used in the plastics, rubber, protective coating, and textile fiber industries. Polymer chemistry, molecular structure, physical properties, and engineering principles are clearly outlined . . . and the book discusses fabricating methods and applications, and the various commercial uses of specific polymers. **By C. C. Winding, Cornell Univ., and G. D. Hiatt, Eastman Kodak Co., 395 pp., illus., $12.00**

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Hardware Debut

Three research equipment developments were highlights of the chemical scene this week.

In ultrahigh vacuums, National Research Corp. (Cambridge, Mass.) has a new, $51,823 Air Force contract for studies of metal outgassing at 800 F and 10^{-10} mm. Hg. This is believed to be the lowest pressure achieved in vacuum equipment in the U.S.

Of potential use in the pharmaceutical industry is a supersensitive rheometer developed by a graduate student at University of Michigan's College of Pharmacy. The new rheometer is said to be a million times more sensitive than other instruments. It costs less ($2.65, plus $3,000 worth of recording devices vs. $16,000) but takes longer to use (2½ hours vs. 1½ minutes). It's used to measure stability of liquid suspensions, such as pharmaceutical emulsions.

And now ready for operation is the continent's first electromagnetic isotope separator. It's a $124,000 machine, purchased in Sweden and now being used at Canada's Chalk River reactor, to analyze minute and short-lived fission products. Separation is similar to that in a mass spectrometer.

New Corticosteroids

After two years of relative inactivity, the corticosteroid field recently brought forth two new entries.

A new orally administered corticosteroid called Haldrone was introduced by Eli Lilly & Co. (Indianapolis) last week. It's 6-α-fluoro-16-α-methylprednisolone 21-acetate. In clinical tests, it has exhibited an anti-inflammatory potency approximately 10 times that of hydrocortisone. It's aimed at steroid-responsive conditions, although cortisone and hydrocortisone are preferred in cases where sodium retention is desired.

Schering Corp. (Bloomfield, N.J.) produced the other new corticosteroid, β-methasone, tradenamed Celestone. It has shown effectiveness as an anti-allergic and anti-inflammatory agent in two years of clinical trials, is said to have fewer side-effects than older corticosteroids, and it will be sold at a lower price.

contest

CONTEST: TO DEVELOP NEW USES FOR THE WORLD'S LOWEST PRICED QUATERNARY

Every now and then we come up with a "mystery" chemical . . . one that seems awfully slow in finding practical applications despite unusually promising physical properties. Such a product is Ansul's TETRA METHYL AMMONIUM CHLORIDE, which our market research people assure us is far and away the world's lowest priced quaternary. Now there should be some jim-dandy uses for this chemical, but we're darned if we've run into any yet. So, we're calling on you for help. Just for fun, during the next 90 days we're going to offer one of our world-famous Ansul dry chemical fire extinguishers for the best suggested use of TETRA METHYL AMMONIUM CHLORIDE. Write us for samples and complete technical information. ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN.

P.S. To further complicate things, our lawyers (who are always messing up good ad ideas) tell us that we have to note that the ideas submitted in our "contest" become the property of the Ansul Chemical Company.

TETRA METHYL AMMONIUM CHLORIDE

PHYSICAL PROPERTIES
Chemical Formula . . . $(CH_3)_4NCl$
Molecular Weight . . . 109.60
Specific Gravity 20°/4° C . . . 1.1690
Melting Point . . . Decomposes when heated
Form . . . White crystalline solid
Solubility . . . Soluble in water, soluble in alcohol, insoluble in ether.

ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN ● INDUSTRIAL CHEMICALS ✱ REFRIGERATION PRODUCTS ● FIRE FIGHTING EQUIPMENT

60-0574

NEW from CARBIDE's Solvent Center...

METHYL ISOAMYL KETONE

for coating manufacturers

CARBIDE now has ready for shipment in commercial quantities this new high-boiling ketone for the nitrocellulose and vinyl lacquer industry—Methyl Isoamyl Ketone—at a new low price.

This high-quality solvent opens new, interesting, and economical approaches to coating formulations.

Its exceptionally low solution viscosity permits the use of more resins in lacquers . . . brings important savings in production time. Methyl Isoamyl Ketone also has high tolerance for toluene and is a natural for vinyl lacquers.

Methyl Isoamyl Ketone offers this attractive package of properties:

Relative Evaporation Rate (n-Butyl Acetate = 100)	45
Dilution Ratio	
Toluene	3.8
Naphtha	1.1
Blush Resistance at 80°F. % Relative Humidity, ± 2%	89
Brookfield Viscosity of Vinyl Formulations	
Formula A*	
At 68°F. (centipoises)	308
18 hours at 24°F., 5 hours at 68°F. (centipoises)	412
Formula B**	
At 68°F. (centipoises)	360
18 hours at 24°F., 5 hours at 68°F. (centipoises)	850
Relative Viscosity at Alkyd Resin (xylene = 100)	84
Pounds per gallon at 20°C.	6.77

*Formula A: 20% BAKELITE Vinyl Resin VYHH
80% Methyl Isoamyl Ketone

**Formula B: 20% BAKELITE Vinyl Resin VYHH
40% Methyl Isoamyl Ketone
20% Xylene, 20% Toluene

For complete information, talk to your CARBIDE Technical Representative, or write to: Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, New York.

UNION CARBIDE is a registered trade mark.

UNION CARBIDE CHEMICALS COMPANY

UNION CARBIDE

IMPORTANT NEWS for
Conveyor Scale Users...

CompuDyne Corporation

announces the acquisition of

TRANS-WEIGH COMPANY

and

AUTOMATIC MEASUREMENTS CO.

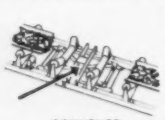
to broaden the facilities of
its subsidiary

Weighing & Controls, Inc.

Sales and manufacturing will be consolidated under Weighing & Controls, Inc. Trans-Weigh Co. and Automatic Measurements Co. have specialized in the development of electronic weighing systems. Weighing & Controls, Inc. have developed pneumatic weighing systems. The consolidation of these companies gives industry the most advanced engineering thinking and the highest production efficiency available, for automatic weighing control and data processing. Any system from the simplest to the most complex will benefit from this new, consolidated source.

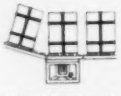
Whether your problem is in Conveyor Scale, Batch Weighing, Constant Feed Weighing, or Check Weighing . . . in heavy or light industry . . . call W & C.

WC102

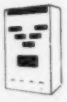


CONVEYOR SCALE SYSTEM

CONSTANT-FEED WEIGH-HOPPER SYSTEMS



CHECK-WEIGHING SYSTEMS



CONTROL PANELS

Weighing & Controls, Inc.
Subsidiary of **CompuDyne Corporation**
Industrial Park, E. County Line Road, Hatboro 10, Pa.

EXPANSION

• The Cyanamid European Research Institute, a $1.7-million laboratory devoted entirely to basic research, was recently opened at Geneva, Switzerland. It was established by American Cyanamid Co. to enlist the skills of European scientists in basic research. A staff of 50 or 60 will occupy 25,000 sq.ft. of laboratory and office space.

• Trionics Corp. (Madison, Wis.) plans to expand its services in chemical, ceramic and electronic R&D to industry and government.

• Jules Porsche, former director of Armour & Co.'s central research department, is now offering consulting services in organic chemistry, biochemistry, nutrition and endocrinology at 138 Oxford Ave., Clarendon Hills, Ill.

• Atlantic Research Corp. (Alexandria, Va.) is starting operation of a new, $150,000 experimental radiation laboratory. Among the studies: solid-propellant combustion, reactor waste products and radiation damage connected with space travel.

• Du Pont's Dyes and Chemicals Division will establish a new dyeing and textile finishing laboratory at Charlotte, N.C. It will be completed this fall and will serve the Southeast.

• A large new experimental distillation tower has been completed by Fractionation Research, Inc. (Alhambra, Calif.), a nonprofit organization set up in '52 by 58 oil, chemical and engineering companies.

• Duriron Co.'s (Dayton, O.) new, $100,000, 80,000-sq.ft. building for nonmetallic research and development will be completed late this year.

• Four new testing and evaluation laboratories for perfume compounds have recently been completed by Fries & Fries Inc. (Cincinnati).

• Continental Oil Co. is building a three-story, $775,000 computer center at Ponca City, Okla., to house its new central computer department and its process center.

• The American Society of Heating, Refrigerating and Air-Conditioning Engineers is closing its Cleveland laboratory, will give its controlled environment unit to the newly established Kansas State Environmental Research Center at Kansas State University (Manhattan, Kan.).

A PERFUME OF PARTS . . . .

HERE, IN TWENTY-SIX PARTS, IS FRAGRANCE COMPOUND No. 35062 . . . .

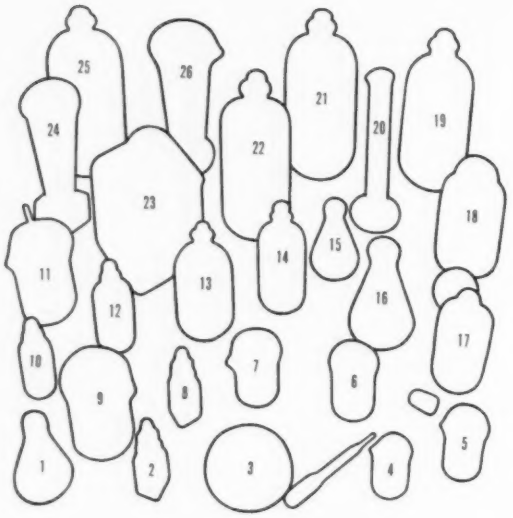
You can identify these individually by referring to the numbered diagram backing this insert. Note that the list includes aromatic chemicals, complex specialties and materials of both animal and botanical origin. Obviously, it was the artistic blending and balancing of these materials by our perfumers that made this very attractive FRITZSCHE creation possible. But behind this accomplishment lies a long record of painstaking care in the selection, manufacture and processing of all of its ingredients. In the case of those botanically derived materials, this actually extends back to their various countries of origin—sometimes halfway around the world! As we see it, this is as it should be, for as supplier, processor and guarantor of such materials, it is our responsibility to provide the best that can be made, and to do that requires complete supervision from original source to finished product. Only by this means can we solicit *your* business with confidence and assurance of satisfaction to YOU.

SEE OVER ⇨

1871... FRITZSCHE ...1961

OUR 90th AND GREATEST YEAR!

KEY TO PHOTO *(on facing page)* . . . .



1. **ABSOLUTE OF JASMINE SEILLANS®**—Exclusive source of supply and special processing.
2. **OIL SAGE CLARY EXTRA**—Exclusive source of supply.
3. **COUMARIN**—Commercially available synthetic.
4. **RESINOID OLIBANUM**—Our own production; Clifton process.
5. **ABSOLUTE OF MOUSSE DE CHENE**—Exclusive source of supply.
6. **TINCTURE CIVET F.B.**—Our own production; Clifton process.
7. **VETIVER ACETATE EXTRA**—Clifton produced synthetic.
8. **RHODINOL PURE**—Isolated by Clifton process.
9. **HYDROXY-CITRONELLAL EXTRA**—Clifton produced synthetic.
10. **TINCTURE AMBERGRIS**—Our own production; exclusive source of supply.
11. **METHYL IONONE GAMMA**—Commercially available synthetic.
12. **ABSOLUTE ROSE DE MAI**—Exclusive source of supply.
13. **OIL SANDALWOOD**—Exclusive source of supply.
14. **ALDEHYDE C-14 EXTRA**—Clifton produced synthetic.
15. **AMBREINE No. 20723**—F.B. specialty.
16. **TERPINEOL ABSOLUTE**—Isolated by Clifton process.
17. **PHENYLETHYL ALCOHOL NF**—Commercially available synthetic.
18. **MUSK KETONE**—Commercially available synthetic.
19. **BENZYL ACETATE**—Commercially available synthetic.
20. **laevo—LINALOOL F.B.**—Isolated by Clifton process.
21. **iso-AMYL SALICYLATE**—Clifton produced synthetic.
22. **ISO EUGENOL**—Clifton produced synthetic.
23. **CINNAMIC ALCOHOL**—Clifton produced synthetic.
24. **LINALYL ACETATE 90/92% ESTER FROM BOIS DE ROSE**—Clifton produced synthetic.
25. **OIL BERGAMOT RECONSTITUTED F.B.**—F.B. specialty.
26. **OIL ORANGE USP CALIFORNIA COLD-PRESSED**—Exchange Brand.

ONLY AS STRONG AS ITS WEAKEST LINK. . . .

How APT is this old saying when applied to the long chain of materials that constitutes the average perfume formulation as typified by the one detailed herewith. Off-notes or lack of purity in any one of the twenty-six items required for this composition might seriously impair the full-rounded effect as originally conceived. That is why it pays, in the long run, to use only those materials for which the supplier is willing to give unconditional guarantees of purity, uniformity and quality. FRITZSCHE has now been giving such assurances to its customers for all of *ninety years!* That is why its record in the many industries it serves continues to be one of the most enviable.

FRITZSCHE BROTHERS, Inc.

76 NINTH AVENUE NEW YORK 11, N. Y.

Branch Offices and *Stocks: Atlanta, Ga., Boston, Mass., *Chicago, Ill., Cincinnati, Ohio, Greensboro, N. C., *Los Angeles, Cal., Philadelphia, Pa., San Francisco, Cal., St. Louis, Mo., Montreal and *Toronto, Canada; *Mexico, D. F. and *Buenos Aires, Argentina. Plants: Clifton, N. J. and Buenos Aires, Argentina.

MANUFACTURERS AND SUPPLIERS OF ESSENTIAL OILS, AROMATIC CHEMICALS, BASIC PERFUME AND FLAVOR RAW MATERIALS

Technology
Newsletter

CHEMICAL WEEK
May 13, 1961

Another new isoprene process was described at the American Institute of Chemical Engineers meeting in Cleveland this week: Houdry Process has adapted its one-step dehydrogenation process developed for butadiene during World War II for making isoprene. It starts with isopentanes or the five-carbon fraction from a catalytic cracker, employs a chromia-alumina catalyst.

The paper was delivered at a symposium at which Scientific Design and Goodyear unveiled their propylene-based process (*CW, May 6, p. 73*). Both groups gave glowing cost estimates for the production of isoprene. Houdry said its process can turn out monomer for 8-12¢/lb., depending on economic conditions. Goodyear-Scientific Design engineers said only that their method could produce isoprene to sell "cheaper than" butadiene (13-15¢/lb.).

The implication from both papers is that polyisoprene should be able to compete handily with natural rubber in the marketplace. The markup for the polymerization should be approximately 8¢/lb.; the selling price of natural rubber fluctuates, is now about 30¢/lb.

•

Baymal, a new form of colloidal alumina, is being introduced by Du Pont this week. The firm is making it available—in developmental quantities—from a unit at Belle, W. Va., which is just starting up. The initial price will be $3.50/lb. but Du Pont expects that it will drop eventually.

It's a fine, white, free-flowing powder of clusters of minute fibrils of boehmite (AlOOH) Alumina. And it has some intriguing properties. It can be dispersed to individual fibrils in water (or a few highly polar solvents). The fibrils have a surface area of 274 sq. meters/gram. Since the particles carry a high positive surface charge, they can be used to coat negative surfaces and then anchor other negative materials.

Du Pont has a raft of ideas on where the product can be used. Included: high-temperature binders and adhesives, inorganic coatings, polymer reinforcement. One application about which Du Pont is not talking but known to be under investigation: a means of forming a temperature-resistant fiber (*CW, April 29, p. 61*).

•

A twist on production of chlorine and sodium by electrolysis: a new experimental fuel cell generates electricity by reacting chlorine (or bromine) with sodium amalgam. It is wrist-watch size, produces I watt of power, was developed by Joseph S. Smatko for Hoffman Electronics (Los Angeles).

•

Now malt production has been automated. Dominion Malting, subsidiary of Canadian Breweries, Ltd., has put its Domalt continuous-flow malting process into operation at a prototype plant in Toronto. It's

expected to permit substantial cost reduction in making malt, a significant cost item in brewing. Last week the Russians disclosed a continuous, automated process for champagne (*CW Technology Newsletter, May 6*).

•

Scotch rumors you have heard about an arthritis "cure" to be revealed by American Cyanamid's Lederle Labs. The facts, says Cyanamid are these: its EACA (epsilon amino caproic acid) has undergone a "double-blind" test. Results will not be known until June 22 when a paper will be delivered at an American Rheumatism Assn. meeting

•

A new liquid chromatograph was revealed at the Pittsburgh Conference on Analytical Chemistry last week by Waters Associates (Framingham, Mass.). It's aimed at boosting liquid-liquid and liquid-solid chromatography to the status now held by gas chromatography.

The key to the new instrument is a new refractometer. Developers say it greatly enhances the usefulness of the technique. It can detect concentrations of the order of a few hundredths of a milligram. One use for it is in analysis of cholesterol in blood streams. Possible chemical process applications include analysis of high-molecular-weight polymers or other complex, high boiling compounds.

•

Results of clinical testing of a new steroid, Celestone were described this week at the Waldorf-Astoria in New York (*see also p. 62*). The new drug, a Schering product, was described by physicians James Q. Gant Jr. and Arnold H. Gould as "the most important step ahead since the discovery of prednisone and prednisolone." Claims made for it: compared with older steroids, it is more potent, acts quicker and has fewer side effects.

•

Another entry in the fresh water from sea water sweepstakes: North American Aviation's Rocketdyne Division will build a pilot plant at Oxnard, Calif., to extract 15-20,000 gal. of fresh water daily from the ocean. It will employ a four-step freezing process: Salt water will be precooled in a countercurrent liquid extraction with a hydrocarbon such as octane, then frozen with a more volatile hydrocarbon such as butane. The ice crystals are then washed and, finally, melted by direct contact with compressed butane. Hydrocarbons are recycled, and the fresh water produced is used to cool them.

The firm says the process is based on "concepts originated by Ludwig Rosenstein and Manuel Gorin," San Francisco consultant firm. But it credits "freezer-washer-melter equipment" design to H. F. Wiegandt of Cornell University.

The Cornell process is being investigated by Blaw-Knox in St. Petersburg, Fla., on a larger scale (35,000 gal./day). Rocketdyne thus would appear to be paralleling Blaw-Knox's work except for the front-end precooler.

IMPACT!

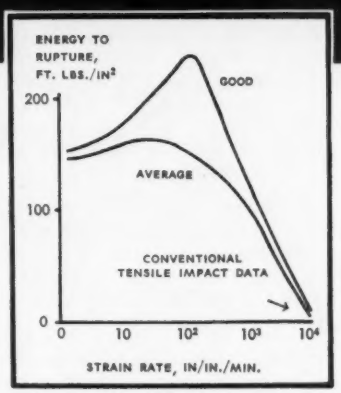
New Plas-Tech Full-Range Universal Tester Correlates With In-Service Performance for General Electric

THE PROBLEM — General Electric at Appliance Park, Louisville, Kentucky, was challenged by the in-service performance of refrigerator door liners. Some liner materials proved better in the field than others. However, in laboratory tests at conventional, static-loading rates **as well as under Izod-impact conditions,** few clear cut differences between materials could be detected.

THE SOLUTION — General Electric contacted Plas-Tech. Utilizing the PLASTECHON Model 581B Universal Tester over a wide range of testing speeds from static-loading to shock-loading, strikingly different tensile profiles were indicated as illustrated in Figure I above. Furthermore, in the impact loading range the PLASTECHON recorded quantitative information pinpointing all **seven impact characteristics** of both materials rather than merely "work to rupture" as provided by conventional impact tests.

THE VERSATILITY — All seven design parameters . . . stress at yield, stress at fail, elongation at yield, elongation at fail, modulus of elasticity or stiffness of material, work to yield, work to fail . . . are now available via PLASTECHON instrumentation over the entire range of equipment performance.

PLASTECHON Universal Testers are so versatile that their ultimate usefulness has yet to be explored, as evidenced by the wealth of new information already provided to the rubber, plastics, metals, textile and paper industries. Standard models are available at loading rates from 0.2 to 15,000 inches/minute with prototype units capable of loading rates up to 200,000 inches/minute. To broaden your knowledge of your products . . . contact Plas-Tech, introducing new dimensions in materials research.



Work to rupture vs. strain rate for representative good vs. average refrigerator door liners.

Model 581B Plastechon Universal Tester

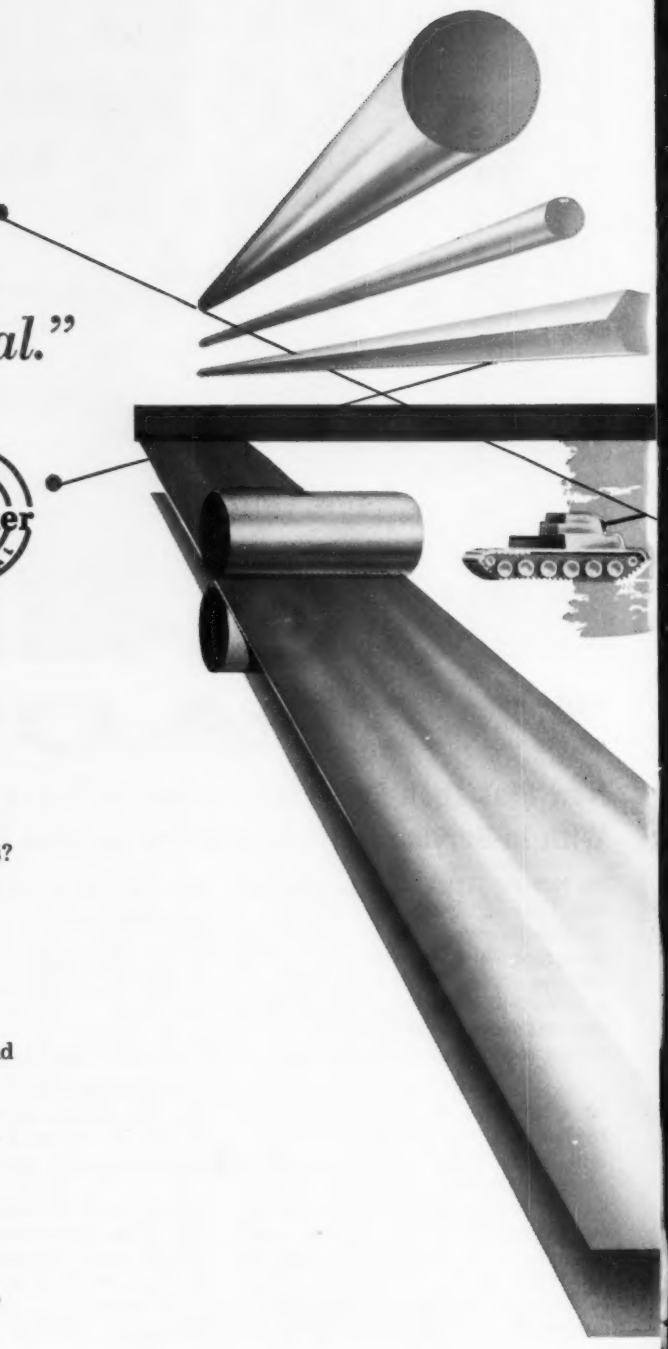
NEW DIMENSIONS IN MATERIALS RESEARCH **plas-tech** EQUIPMENT CORPORATION

4 MERCER ROAD, NATICK, MASSACHUSETTS • OVERSEAS REPRESENTATION — AD. AURIEMA, INC., NEW YORK

BAKER PROCESSING CHEMICALS... *one of*

"...You gave us the full benefit of your years of experience in handling this key processing chemical."

...writes Reactive Metals, Inc. to J. T. Baker



And we at Baker are happy we could help. We've had many years of experience manufacturing and handling high purity processing chemicals. If we can share the benefits of this experience to help our customers, we're delighted to do so.

J.T.Baker CHEMICAL

As Reactive Metals, Inc., a pioneer producer of zirconium and titanium, wrote us: *"One of the essential processing chemicals we use is supplied by your firm. This material has always met our specifications. You gave us the full benefit of your years of experience in handling this key processing chemical and we were thus able to design tested and proved engineering right into our new facilities."*

You, of course, may not require chemicals made to your own specifications. But have you investigated the benefits of the precision processing chemicals J. T. Baker regularly supplies? Although competitively priced, they offer you *exceptionally* high purity and uniformity... *consistently* high purity and uniformity... ton after ton.

Would you, for example, like to increase your processing speed? Reduce costs? Save purification steps? Eliminate variables? Save manpower in plant and laboratory? Upgrade your product? Reduce rejections? J. T. Baker controlled purity tonnage chemicals save time and money and perform smoothly under the most challenging conditions.

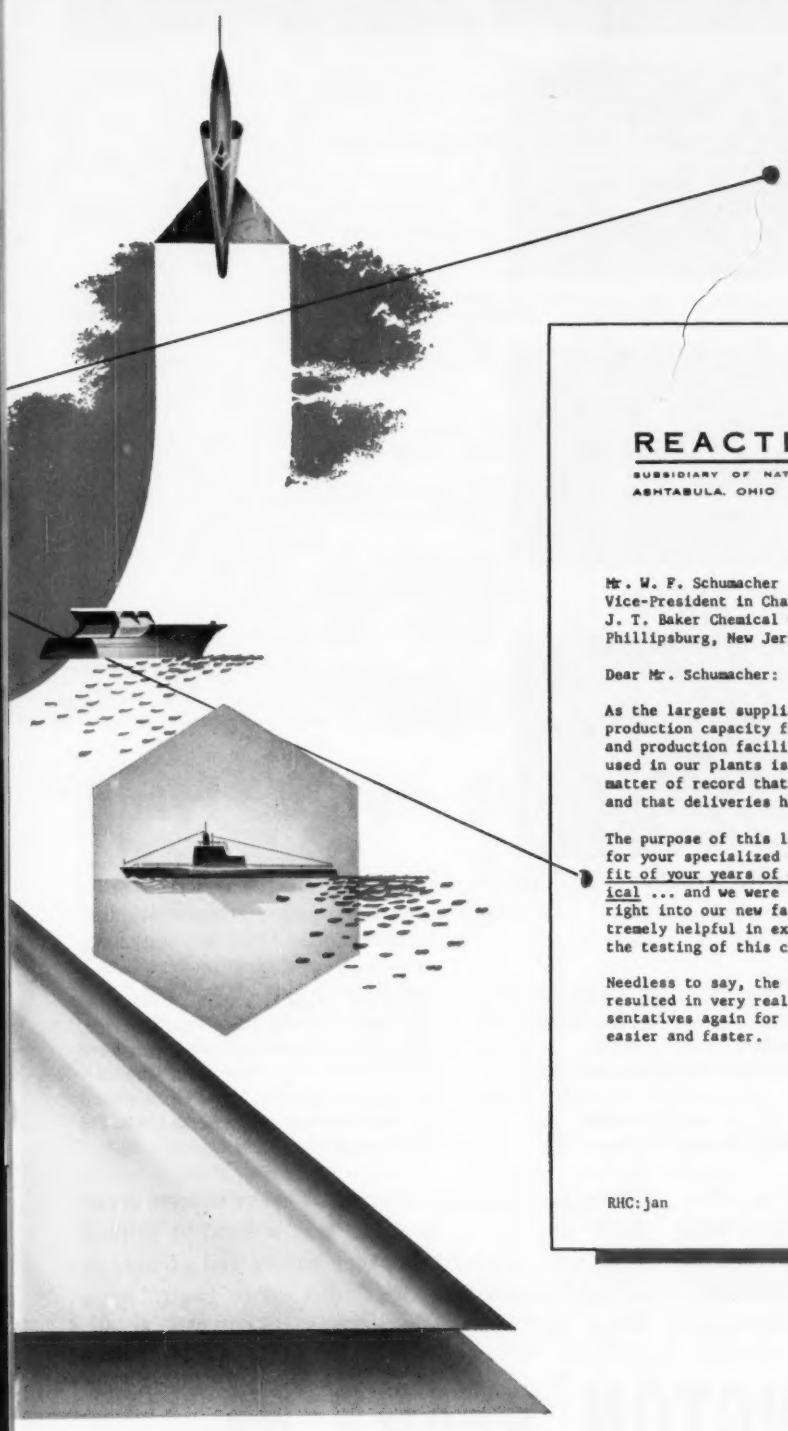
Please feel free to call on us for additional information. We are here to give you the full benefit of our experience in producing superior chemicals for industry.

J. T. Baker Chemical Co.

Phillipsburg, New Jersey

PURITY BY THE TON—FOR

the guardians of Reactive Metals' precious trademark



R M I

R M I

REACTIVE METALS, INC.

SUBSIDIARY OF NATIONAL DISTILLERS AND CHEMICAL CORPORATION
ASHTABULA, OHIO NILES, OHIO

Ashtabula, Ohio
December 1, 1960

Mr. W. F. Schumacher
Vice-President in Charge of Sales
J. T. Baker Chemical Company
Phillipsburg, New Jersey

Dear Mr. Schumacher:

As the largest supplier of A. E. C. zirconium and with even greater production capacity for titanium, we are very proud of our plants and production facilities. One of the essential processing chemicals used in our plants is supplied by your firm. We wish to make it a matter of record that this material has always met our specifications and that deliveries have always been on schedule.

The purpose of this letter, however, is to express our appreciation for your specialized technical assistance. You gave us the full benefit of your years of experience in handling this key processing chemical ... and we were thus able to design tested and proved engineering right into our new facilities. Your laboratory staff, too, was extremely helpful in extending the benefit of their long experience in the testing of this chemical.

Needless to say, the cooperative effort between your staff and ours resulted in very real savings in time and expense. Thank your representatives again for their excellent liaison. It made a big job go easier and faster.

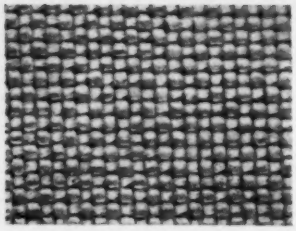
Sincerely,

R. H. Coleman
Division Manager

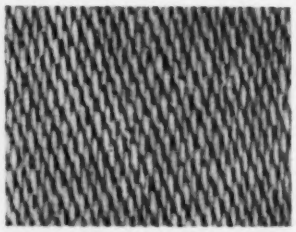
RHC:jan

PRODUCTION USE

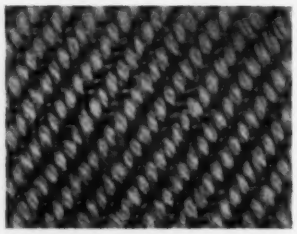
FILTER FABRIC QUIZ



1. This is a plain weave . . . TRUE ☐ FALSE ☐



2. This is a twill weave . . . . TRUE ☐ FALSE ☐



3. This is a satin weave . . . TRUE ☐ FALSE ☐

1. TRUE. You can always identify a plain weave by its simple "one up and one down" construction. It permits maximum yarn interlacings per square inch and, in a tight weave, affords high impermeability and covering qualities. Used in cottons and synthetics.

2. FALSE. This is a satin weave. With fewer interlacings, spaced widely and regularly, a satin weave has increased porosity, smooth surface and high cover factor. It is valuable in gaseous filtration, such as dust collection. In cotton, commonly known as sateen.

3. FALSE. This is a twill weave—distinguishable by the sharp diagonal line. In equivalent constructions, twills have fewer interlacings than plain weaves—and greater porosity. Filter twills woven of both cotton and synthetic fibers are widely used.

Weave is a very important consideration in the selection of a filter fabric, but many other factors help determine a fabric's performance—fiber, count and finish, for example. That's why you need the assistance of a specialist—like the specialists who distribute Wellington Sears filter fabrics. They're experts in the field—and always ready to lend a hand in helping solve your problems. For their names, and a free copy of our illustrated booklet, "Filter Fabric Facts," write Dept. M-5

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"Synthetic Natural" Rubber Polymerization Catalysts

	Product and Capacity (tons/year)	Catalyst
American Rubber & Chemical Louisville, Ky.	Polyisoprene and polybutadiene*—30,000	Ziegler
Firestone Tire & Rubber Orange, Tex.	Polybutadiene—30,000	Butyl lithium
Goodrich-Gulf Institute, W. Va.	Polybutadiene—25,000 (under construction)	Ziegler—aluminum alkyl with cobalt or titanium halide
Goodyear Tire & Rubber Beaumont, Tex.	Polyisoprene and polybutadiene—40,000	Said to use lithium-based catalyst
Phillips Petroleum Borger, Tex.	Polybutadiene—25,000	Uses modified Marlex—chrome oxide on silica-alumina; iodine is involved
Shell Chemical Torrance, Calif.	Polyisoprene—20,000	Butyl lithium
Marietta, O.	Polyisoprene—40,000 (under construction)	Butyl lithium
Texas-U.S. Chemical Port Neches, Tex.	Polybutadiene—20,000 (under construction)	New proprietary catalyst
U.S. Rubber Baton Rouge, La.	Semicommercial plant	Under evaluation

*Polyisoprene plants can convert to polybutadiene production (and vice versa) with minor modifications. Plants specified as both are especially adaptable to a switch.

Butyl Lithium Steps Out

A 100,000-lbs./year butyl lithium catalyst plant at Foote Mineral Co.'s New Johnsonville, Tenn., location has gone onstream; and Lithium Corp. of America (New York) has just completed facilities to sell its butyl lithium in a new, purer, nonexplosive form (CW Technology Newsletter, May 6). These two developments are taking butyl lithium from the pilot plant to full-scale commercial production.

Although most synthetic rubber producers have made their catalyst choice (*see chart, above*), some might re-examine their decisions in the light of current developments. All the polymer producers are continually evaluating catalysts, and a change from one to another would require only minor process revision.

Today butyl lithium capacity is far above demand. Output of Foote Mineral's 100,000-lbs./year plant could be tripled by running the plant three shifts. Lithium Corp. can put out 150,000 lbs./year at its Bessemer City, N.C., works. American Potash & Chemical Co., another major butyl lithium producer, has capacity for more than 75,000 lbs./year at its Los Angeles plant. This adds up to 325,000-lbs./year capacity.

In contrast, sales in '60 were about 20,000 lbs.—mainly for pilot-plant evaluations. (None of the plants charted here were onstream before Oct. '60.)

Only a few years ago the price of butyl lithium was about $100/lb. Now quantity contracts get a $5.75/-lb. price.

Underpinning this improvement and butyl lithium's commercial hopes are processing advances that have yielded a purer, safer, easier-to-handle product.

New Plant: Foote Mineral's new plant (*see flow sheet, p. 74*) boasts three key points: (1) use of high-purity lithium; (2) elimination of a dispersion aid; (3) close reaction control. Other butyl lithium producers also say they use high-purity lithium.

Improved lithium ore purification techniques to produce 99.8%-pure lithium have, in turn, resulted in a purer butyl lithium—96% or higher. The benefit of this cleaner catalyst to the customer: more catalyst activity.

Processing begins as lithium metal is dispersed in hydrocarbon solution —either pentane, hexane or heptane, depending upon the customer's wishes. Usually a maleic-stearic acid mixture is added to the hydrocarbon to aid the dispersion. But Foote Mineral says that the acid adheres to the lithium and must be removed. In the new process the dispersion aid is eliminated; fine-particles—200 microns and smaller—are attained through closely controlled agitation.

Reducing particle size permits better control of the reaction of the lithium and butyl chloride. Instead of large lithium particles reacting quickly and violently the small particles react smoothly and controllably.

New Form: The market for butyl lithium stands to benefit from the new product form, as well as its purity. Lithium Corp. now sells pilot quantities of its butyl lithium in a homogeneous paraffin wax emulsion. Ordinarily, butyl lithium is sold in a hydrocarbon solution because the pure product reacts violently with moisture in the air. Lithium Corp.'s new form eliminates the need for the hydrocarbon medium. It is not affected by one hour's exposure to the air or water.

Catalyst Competition: To grow, butyl lithium must buck the Ziegler catalysts, discovered by Karl Ziegler at the Max Planck Institute in Germany. These catalysts—slightly cheaper than butyl lithium—are combinations of aluminum alkyls and a metal halide, usually titanium tetrachloride.

Besides Ziegler-type catalysts, butyl lithium also competes with Phillips Petroleum's polyolefin catalyst: chrome oxide on a silica-alumina base. For polybutadiene Phillips is using a slight modification of this catalyst.

To cloud the choice of catalyst, the chemical mechanisms of polymerization are almost unknown. There are several theories,* though, and through empirical testing a choice is made.

Choice: Take the case of Shell. It has been using butyl lithium since it

* See "Symposium on Monomers and Polymers from Petroleum," Vol. 6, No. 2-c, March 22-25, 1961, by American Chemical Society, for extensive references.

went into polyisoprene catalyst evaluation well over two years ago. First choice was 15% n-butyl lithium in normal heptane solution. But then the company switched to the more reactive secondary butyl lithium.

The problem had been oxidation. Any impurities would deplete the catalyst, convert it into lithium hydroxide. This would happen with water in a concentration as low as one part per million. And it happened with competitive catalysts as well.

The impurity problem was solved prior to entering the polyisoprene reactor by passing feedstocks over anhydrous ammonia. Then the catalysts worked well, secondary butyl lithium leading the others.

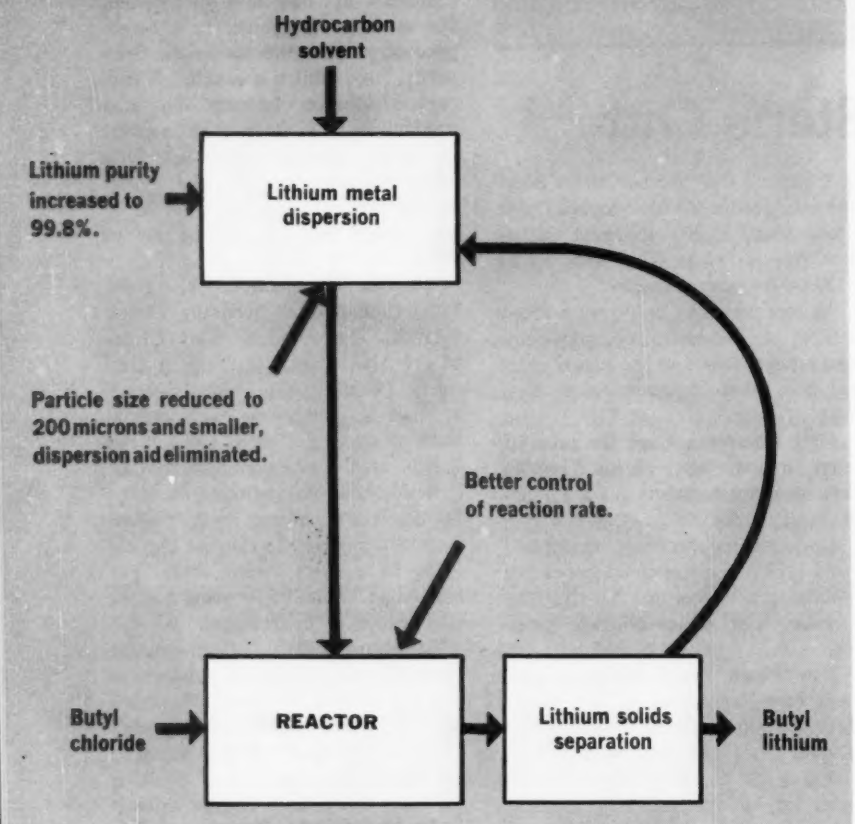
Firestone, at Orange, Tex., also picked butyl lithium. However, word in the trade is that the polybutadiene produced is of low-*cis*-1,4-polybutadiene content—50% or less. Most polybutadiene is 95% or higher.

Since the market is for high-*cis*-content polybutadiene, Firestone is likely to get into this business, probably would still produce low-*cis*-content product. But chances are that butyl lithium would not get the call to double duty, for its market is in polyisoprene or a low-*cis*-content polybutadiene.

Producers of butyl lithium claim that Ziegler catalysts are harder to handle. The exact composition is often hard to define. Thus there is the possibility of difficult polymerization control.

On the other hand, when Ziegler catalysts are used, polyisoprene is almost of the same molecular weight as natural rubber. Butyl lithium gives higher molecular weight. Ziegler catalysts yield 95% *cis*-1,4 content vs. about 93% for butyl lithium polymer. Consequently, lithium-polymerized isoprene may require more milling at the rubber plant.

Key Changes in New Butyl Lithium Plant



Patents: Firms engaged in isoprene or butadiene polymerization may run into patent infringement suits. Producers waiting for final patents to come through include Goodrich-Gulf, Shell, Firestone, Goodyear and Phillips. All the catalyst systems will be covered, but how much they overlap will take years to determine.

The Market: Since almost all the butyl lithium output is tied to the polymerization market, a clear rise in sales is certain. Although the first commercial polyisoprene or polybutadiene plant — Shell's 40,000-tons/year plant at Torrance, Calif. — has been onstream only seven months (*CW, Oct. 22, '60, p. 81*), production of both polymers is slated to hit 75,000 tons this year, 250,000 tons in '65.

It is estimated that about 1 lb. of catalyst is used for each 1,000 lbs. of butadiene or isoprene polymer. Assuming no catalyst losses, sales of both butyl lithium and Ziegler catalysts will total over 100,000 lbs. this year, 500,000 by '65.

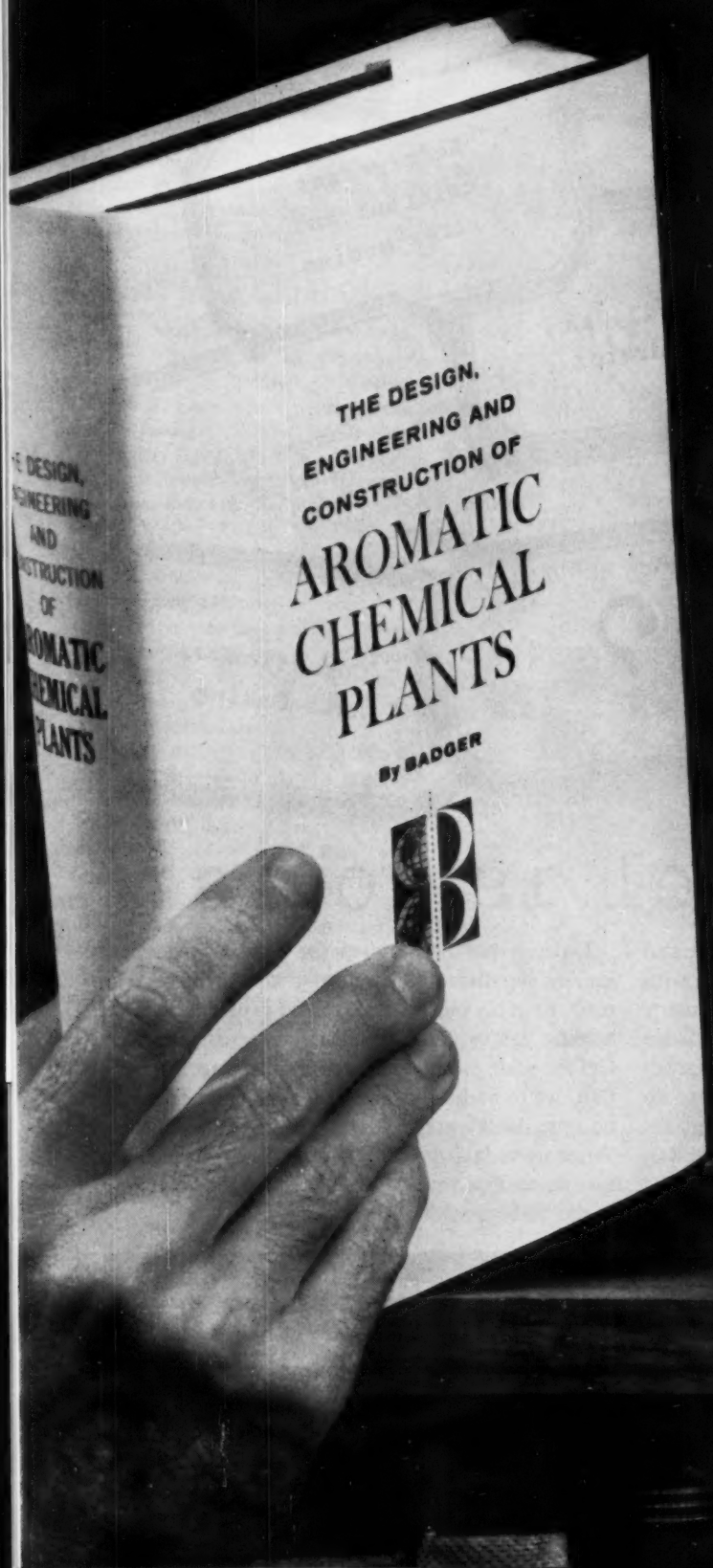
Since the Ziegler catalysts are slated for use in two plants and at least one other does not use butyl lithium, potential sales of butyl lithium this year are about 100,000 lbs. By '62, when the second Shell plant is onstream, this will rise to 180,000 lbs.

Investment: At first look, in light of the 325,000-lbs./year butyl lithium capacity, these market figures point to certain and severe overcapacity. But two factors brighten the picture: (1) butyl lithium can now be expected to make deeper inroads into polyisoprene production, both in the U.S. and in Europe; (2) investment in butyl lithium is relatively low.

What the European market offers is hard to predict. The Ziegler catalysts have been in German hands for more than a decade. And Montecatini (Italy) has Giulio Natta, whose catalysts and theories are well known and respected.

As for investment, Foote Mineral's 100,000-lbs./year plant cost approximately $250,000, a modest figure, considering that the same investment could yield 300,000 lbs./year. The turnover value (annual sales value over capital investment, based on an average butyl lithium price of $7/lb.) is 8.5. The same ratio for profitable, large-volume chemicals ranges from 1 to 8. Most product ratios are near 1.

For butyl lithium, however, this 8.5



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ratio assumes that Foote Mineral's annual maximum sales are $2.1 million on full production. But more realistic annual sales would be 30,000 lbs. In this case, the turnover ratio would be 0.85, still a comfortable value.

Outlook: For all three butyl lithium producers, the future is still hazy. How Lithium Corp.'s nonhazardous catalyst will be received is difficult to foresee. This of course, is also true of Foote Mineral's product. But while overcapacity is certain for at least another year, the scene appears to be bright over the long run.

Phenol from Lignin

More details have been uncovered on the wood lignin hydrogenation process recently licensed by Crown Zellerbach Corp. from Japan's Noguchi Institute (CW Technology Newsletter, April 22, '61). An engineering estimate based on Japanese economics indicates that a plant capable of treating 22,000 tons/year of lignin with this process would cost about $2.8 million, yield a return on investment of 24% before taxes.

The Japanese say phenolic compounds can be produced from lignin by this method at lower cost than they could be made from coal chemicals or petrochemicals.

If these estimates can be realized equally well in the U.S., the process offers a new outlet for about 500,000 tons/year of lignin currently available in the waste liquor from 2.5 million tons of sulfite-process paper pulp.

Catalyst Key: Key to the process is a catalyst that acts with hydrogen to split off aliphatic side chains from a six-carbon benzene ring in a chemical reaction resembling those of petrochemical hydrodealkylation reactions (*CW, March 4, '61, p. 46*). Unlike petrochemical hydrodealkylation, however, wood lignin hydrocracking is restricted by:

- Sulfur. The lignin compounds recovered from sulfite pulping liquor contain about 5% sulfur in lignosulfonates and thiolignins. Since this sulfur poisons catalysts containing nickel, molybdenum and copper, none of these can be used.
- Catalyst price. In the process, catalyst is mixed with a lignin paste and must be recovered—an expensive operation—or thrown away. The No-

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guchi process uses a catalyst cheap enough to be discarded after a single pass. Cost bars all catalysts based on the noble metals.

• Selectivity. Lignin, a polycondensate of phenylpropane derivatives, must be broken down to benzene without breaking the benzene ring itself. Thus the hydrocracking reaction is a relatively gentle one, yielding comparatively simple aromatic compounds. Only the more complicated side chains, especially the methoxy group, are stripped off.

Best guesses are that the catalyst that surmounts these restrictions is based on chromium, cobalt, or a mixture of the two.

The Process: Before the hydrocracking reaction, the lignosulfonate must be separated from the waste pulping liquor. Lime is added until the pH reaches 10.5. A catalyst is added; the alkaline liquor is heated to about 300 F; the lignin (about 6% of liquor) is precipitated and collected. Solids recovered by this system contain about 3% ash, are ready to feed the conversion process.

The conversion process operates through three stages: (1) paste manufacturing; (2) hydrocracking; (3) separation. In the paste-making operation, the solid lignin precipitated from the sulfite liquor is mixed with a heavy petroleum oil, which has an initial boiling point of about 500 F. Solids and oil are ground together in a ball mill under an inert atmosphere, producing a paste light enough to be pumped.

This paste is then combined with the special catalyst (0.5%) and the mix fed through heat exchange to the hydrocracking reactor, where it is retained for 30-60 minutes at 700 F and 3,400 psi. gauge, hydrogen pressure. Under these conditions essentially all of the lignin is converted into a reactor effluent containing: *p*-cresol (25%), 4-ethyl phenol (6%), 4-propyl phenol (5%), dihydrobenzenes (12%), aliphatic alcohols and ketones (11%), recovered heavy petroleum oil (22.5%), and miscellaneous solids (18.5%).

The effluent is filtered to remove solids and is passed to vacuum distillation, where the heavy oil is separated as a bottoms product for recycle to paste manufacturing. The components boiling below 500 F are separated in a second distillation tower

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into two cuts, one containing the dihydroxybenzenes, which boil at 450-500 F, and the second containing a mixture boiling below 450 F. While the dihydroxybenzenes are purified by solvent extraction, the low-boiling mixture is acid treated and redistilled to separate the aliphatic alcohols and ketones, the *p*-cresol, and the phenols.

Although this process has been proved in a prototype plant in Japan, its U.S. success depends on relatively large-scale operation in commercial plants; results could be better or worse. Assumed costs: recovered lignin for paste at $14.2/ton, heavy petroleum oil at 1.3¢/lb., labor at $2.78/man-day, and hydrogen at 3¢/cu.ft. For the return on investment the estimate assumed 12.6¢/lb. for an average value of the phenolic products, 23¢/lb. for the dihydroxybenzenes, and 1.3¢/lb. for the neutral aliphatic aldehydes and ketones.

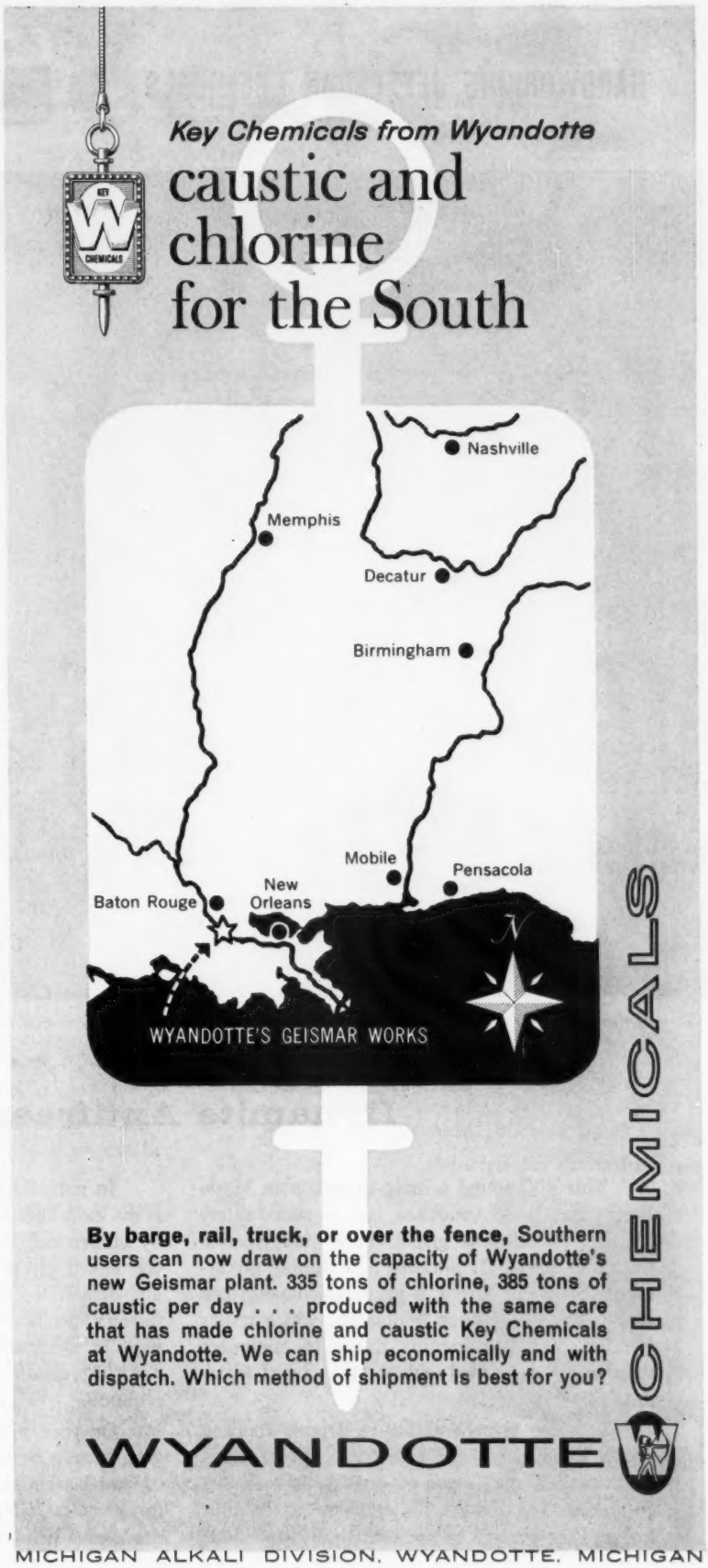
The verdict will depend on how stabilized U.S. costs compare with these estimates.

PROCESSES

Metallic Antimony: What Russia claims is the first fully automated plant for extracting metallic antimony is reported to have raised output of the metal by 20%. The plant, at Kirghizia, Russia, uses a fluidized bed operated at over 1000 C. The antimony ore is fired in this bed and the resulting antimony compounds are then sublimated and converted into lower oxides. Pure antimony can be easily extracted from these oxides, according to a Tass account.

•

Radioactive Waste Storage: Storage of radioactive material in a glass-like mixture (essentially inert) is meeting early success. Much of this work by U.S. and Canadian teams is still in the research phase, but the Atomic Energy Authority (London) has a pilot plant in an advanced design stage. The unit, at Harwell, England, will mix liquid radioactive wastes with a slurry of silica and borax. The glass that forms will incorporate 20-30% waste oxides. Operations at the new plant, designed to ease the problem of radioactive waste disposal, are expected to start next year. The plant's capacity for handling radioactivity is slated to be 1,000 curies, says AEA.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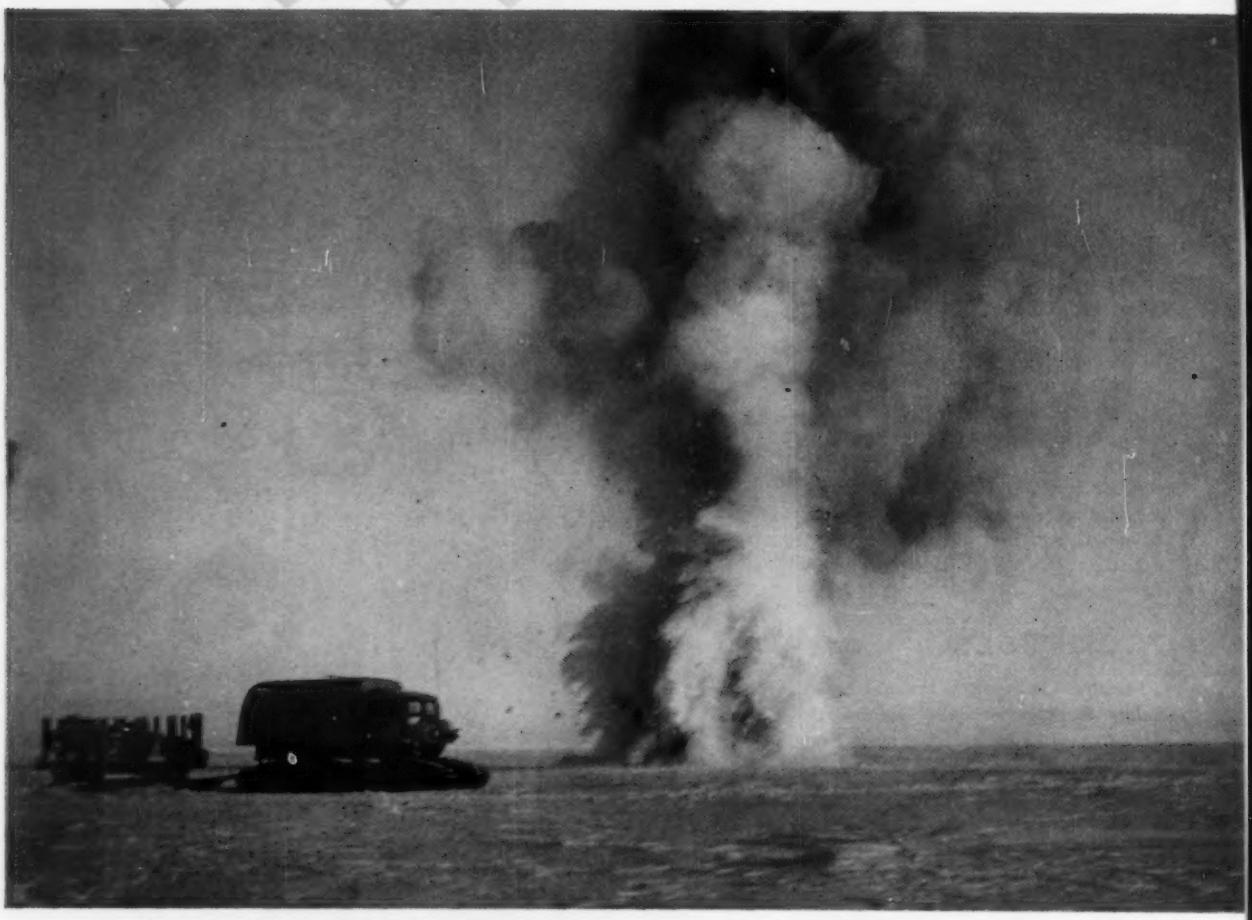

Photograph: Courtesy of N. A. Ostenso, Geophysical and Polar Research Center, The University of Wisconsin.

Dynamite Antifreeze

This 400-pound seismic explosion in Marie Byrd Land, West Antarctica, had an added safety factor . . . ethylene glycol. Pure nitroglycerine freezes at 56° F. By nitrating a mixture of glycerine and ethylene glycol, a nitroglycerine-ethylene glycol dinitrate solution is obtained which resists freezing. This low-freezing dynamite minimizes the dangers associated with the thawing of dynamite prior to use.

Ethylene glycol's ability to depress freezing points, coupled with its high boiling point, leads to its largest use — non-evaporative automotive antifreeze. The market for ethylene glycol antifreezes this year will be some 110 million gallons.

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SPECIFICATIONS

GLYCOLS:	ETHYLENE	DIETHYLENE	TRIETHYLENE
Water, wt.%	0.30 max.	0.20 max.	0.10 max.
Acidity as acetic, wt.%	0.005 max.	0.005 max.	0.01 max.
Ash, wt.%	0.005 max.	0.005 max.	0.01 max.
Boiling range, ASTM, °C.			
IBP:	195 min.	242 min.	278 min.
DP:	207 max.	250 max.	300 max.
Specific gravity, 15.6/15.6°C.	1.1174 min.	1.1190 min.	—
	1.1179 max.	1.1220 max.	—
Specific gravity, 20/20°C.	—	—	1.124 min.
	—	—	1.126 max.
Color, Pt-Co scale	15 max.	15 max.	25 max.

SELECT PROPERTIES

Boiling point, 760 mm., °C.	197.2	244.8	287.4
Flash point (open cup), °F.	240	290	330
Specific heat, cal./gm./°C.	0.544	0.551	0.525
Viscosity, 25°C., centipoise	17.4	—	—
Viscosity, 20°C., centipoise	—	35.7	47.8
Weight, 20° C., lbs./gal.	9.28	9.31	9.36

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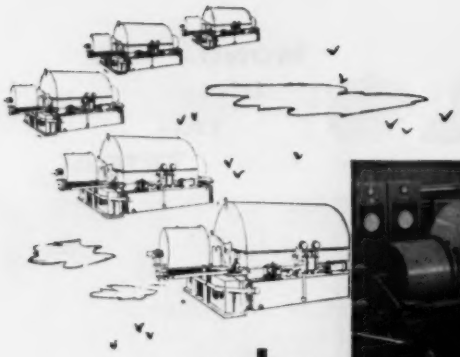
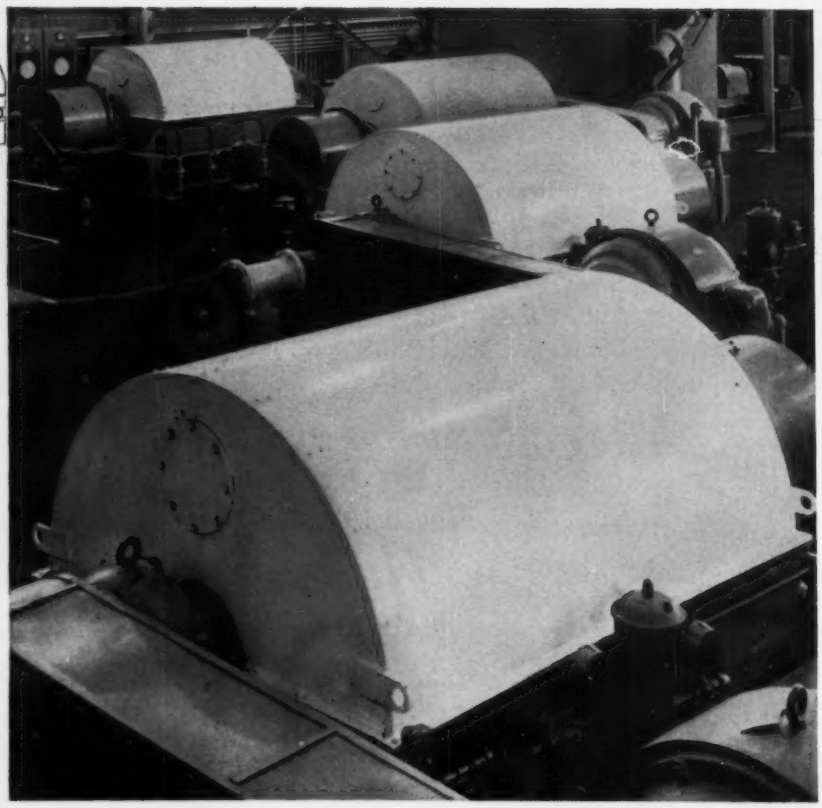


why BIRDS flocked to Carlsbad, N.M.



There are fifty-one Bird Continuous Solid Bowl Centrifugals on the job in the Carlsbad area, dewatering an enormous combined tonnage of salts every day. These Birds are handling all types of solids in process, from slimes to coarse crystals, with thorough washing when required.

The following quote from a report made by one of the big potash plants in Carlsbad tells why. "*Bird Continuous Centrifugals were chosen after careful consideration of all factors. They produce constantly uniform results; there are no filter cloths or other media to blind or be renewed. Installed cost is lower than that of other types of dewatering equipment. Space occupied per ton is much less and power input is smaller. The Bird handles wide variations in feed volume, consistency and particle size. Only casual supervision is required. Maintenance cost is considerably less than that of other dewatering equipment.*"

Whether you process potash, polystyrene, potato starch or other products involving solid-liquid separation, you would do well to get the facts and figures on this Bird. The Bird Research and Development Center has what it takes to provide them promptly and accurately.

A representative installation at Carlsbad. These Birds are fed from the flotation cells that separate the potassium and sodium chlorides. The feed contains about 40% solids and dewatered concentrate contains only about 6% moisture.

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New Spin for Motor Speed

Gordon Rawcliffe, who heads the electrical engineering department at the University of Bristol, wound up a whirlwind U.S. coast-to-coast tour of electric motor manufacturers this week and went winging back to England. He left the motor makers mulling over possibilities of a new technique for moving a step closer to realization of a production man's dream—an inexpensive variable-speed alternating-current motor.

Right now, when industry purchases a workhorse ac. induction motor—because of its ruggedness and simplicity in driving pumps and other process equipment—it has only the choice of settling for a fixed speed or paying a premium for variable speed.

Rawcliffe has no illusions about his technique answering the variable-speed dream. But he has found a way to reconnect the coils of the stator winding in the squirrel-cage induction motor (rotor resembles a squirrel cage, consists of bars that are usually cast to end rings) for two speeds at little penalty in cost, simplicity or power. At higher cost there's potential for three, four and six speeds. Today to get more than a single speed, industry may pay more than double the basic price.

During four years of development work, Rawcliffe built and tested several electrical motors rated between three and 900 hp. The first two commercial motors have been in use in a British steel mill for about two months. And several 800-hp. motors are being built for British industry.

Associated Electrical Industries Ltd., Brush Electrical Engineering Co. Ltd. and Lancashire Dynamo and Crypto Co. Ltd. helped in the development, have three-year licenses for making and selling the motors in Great Britain. The National Research Development Corp. (Washington, D.C.) is looking for licensees in this country.

Limited Potential: Whether U.S. motor makers adopt Rawcliffe's two-speed design will probably depend on the number of potential applications that can be developed. Of all the ac. motors in the chemical process industries today, probably no more than 5% have variable speeds. And one chemical company engineer estimates that only 0.1% are of the two-speed type.

For most applications, economics seem to favor running a plant's equipment, such as pumps, at a single speed and losing a certain amount of the power in throttling of flows to get the desired flow rate. Where speed control is most needed—in processes such as synthetic fiber and plastics manufacture—the speed changes are usually required over a very narrow range (e.g., 1 or 2%).

Two-speed motors commonly change speed by shifting the number of poles that set the speed (e.g., a six-pole motor runs at 1,200 rpm.; eight-pole, at 900 rpm.; 10-pole, at 720 rpm.). One method of pole shifting is to have two windings (e.g., one with six poles and one with eight poles) in the motor. But this adds about 40% to motor cost.

Another method, which may add less than 10% to cost, is to have a single, tapped winding. But the minimum speed ratio with a tapped winding is 2:1 (e.g., 1,200 and 600 rpm.), and there is considerable drop in horsepower (e.g., a 100-hp. motor may develop only 25 hp. at 900 rpm.).

Minimizing the Shift: Rawcliffe's technique minimizes the speed shift of a tapped-winding motor, maintains horsepower output at both speeds at about 85-90% of a single-speed motor. Power factor and other performance characteristics are about the same as for a single-speed motor.

However, the speed changes are limited to the poles that can be obtained in the motor winding. For example, some of the speed combinations are 1,200 and 900 rpm.; 900 and 720 rpm.; 720 and 600 rpm.

Rawcliffe calls his speed-changing method "pole-amplitude modulation" because of the logic on which it depends. He points out that in a conventional three-phase induction motor the mmf. (magneto motive force) waveform for each phase has approximately sinusoidal distribution around the stator assembly. With suitable coil reconnections in the stator winding, the waveform amplitude is modulated

Rawcliffe: 'We can now add a second speed to single-speed ac. motors.'

'I have no illusions about this idea being the answer to variable speed.'

CW PHOTOS—MORT SCHREIBER

'Simplicity is the key to low cost and commercial use of the method.'

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in space, resulting in a different waveform distribution around the stator.

For example, the waveform of one phase winding of a pole-amplitude modulated eight-pole machine contains waveforms corresponding to a mixture of six- and 10-pole machines. The unwanted pole number can be eliminated by obtaining the correct relative displacements between the three separate phase windings.

Rawcliffe has worked out mathematical principles for the best coil grouping and sequence of connections for various speed combinations. If the best grouping and sequence of connections is not picked, the motor will be noisy, may have poor starting characteristics, etc.

The connection sequence is complicated; but once it has been worked out, the worker has only to follow the proper sequence. The motor is of standard construction, uses standard coils that are put into the slots in a standard way. Conventional equipment can be used for switching speeds; this requires only a few cycles of cutout. This means that the additional cost of setting up a single-speed motor for two speeds is small. And large plants that sometimes do their own motor repair and rewinding could make the reconnections themselves.

Simplicity: While Rawcliffe delights in mathematically developing the best coil grouping and sequence of connections, he is quick to point out that "simplicity is the key to commercial success. In spite of the complicated connection sequence, we need only six terminals on the machine for plant power hook up. This is the same number of terminals needed for a two-speed machine that has two windings, because three terminals are needed for each winding," he says.

(However, one complication would be an ordinary single-speed, double-voltage—i.e., 220 and 440 v.—motor, which has nine terminals. A single-voltage motor normally has three terminals.)

About getting three speeds from a single winding, Rawcliffe says: "I know it will work. The only problem is: How simple will it be? If it is only half again as complex, it could probably be commercially useful. But if it is twice or three times as complex, it probably wouldn't be practical."

Four speeds can be obtained from a motor with two windings, which would add to cost as well as complexity.

Other Motors: Rawcliffe, after his three-week tour here, is anxious to get to work on the mathematical principles for a two-speed synchronous motor. Probably the only basic difference is that the synchronous motor has a wound rotor, while the induction motor has a rotor made up of bars secured to end rings (actually a cast winding). In fact the synchronous motor is started up as an induction motor, switched to synchronous operation when it gets up to speed.

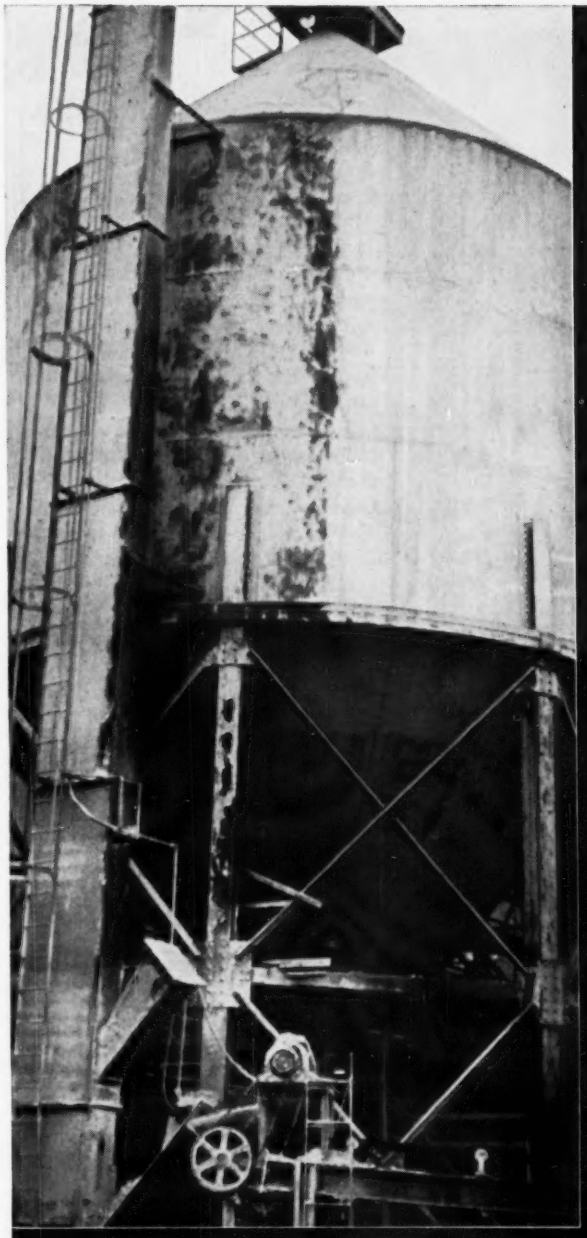
A development in the synchronous field would, however, probably find limited interest among chemical process firms because it often isn't used in sizes smaller than 1,000 hp. Synchronous motors draw a higher power factor than induction motors, which have power factors usually a little below 90%. Purchased power generally costs less when high power factor is maintained, but static capacitors can be used with induction motors to raise the power factor.

Synchronous motors are difficult to maintain in chemical atmospheres. Without complete enclosure the slip-ring area may become contaminated, result in flash-overs and failure of the insulation. And because the motor is complex, maintenance in general is a greater problem.

Complexity is probably the main reason why direct-current motors aren't used more often, even though they have the variable-speed control. Their complexity (e.g., wire-wound armatures and connections to each commutator bar) at least doubles the cost of ac. motors. Moreover, most plants would have to add rectifiers to convert their regular ac. power to dc. The rectifiers are used mainly by companies normally converting large amounts of ac. power to dc. for electrochemical operations; these large rectifiers cost about $30-40/kilowatt.

Other Controls: However, direct current can be used to change the speed of ac. motors by varying the frequency of the alternating current instead of varying the number of motor poles, as Rawcliffe proposes. Solid-state devices can be used and speed can be controlled to 0.1%.

But the solid-state rectifiers cost about $70-80/kilowatt, run the ac. motor cost up to about four times that



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of a single-speed motor. "We would like to get the cost down to about $10/kilowatt, but that is probably a long way off," says an engineer at a Midwest electrical equipment manufacturing plant.

Engineers at some chemical companies are hesitant about the use of solid-state devices for another reason: they are still in the development stage, haven't built up the reliability that is felt to be needed.

However, the same type of close-range control can be obtained at about the same cost by using a dc. motor generator set to drive an alternator. The drawback: one motor generator set is usually hooked up with a number of ac. motors for economy. This means that the ac. motors' speeds can't be varied individually.

Electromagnetic couplings also can be used to regulate motor excitation, but they more than triple the motor cost. Motors with belt drives permit fairly close-range speed control, but usually double the cost. Also, there are motors on which brushes can be shifted. They offer speed control to about 1%. But because brush shifting can cause maintenance problems, add to the cost, this type has not been popular in this country, is now made only in Europe.

A low-cost, variable-speed ac. motor still appears to be a long way off. Meanwhile, Rawcliffe's technique is getting industry's attention, may get a chance to bring two-speed motor costs down while maintaining efficiency.

Sieves Take Shape

Engineers of Union Carbide Corp.'s Linde Co. at Tonawanda, N.Y., are doing a bit of head-scratching this week over a new form of molecular sieve that's being produced in molded shapes instead of the usual small pellets and beads. Cores, about 3 in. long with walls ½ in. thick, are already in use in cartridges that trap moisture in refrigeration systems. But the ease of handling molded shapes has the engineers seeking new uses for them.

Linde won't tell how it is molding the material, or what binder it uses. But it says there is no reason why any of the various molecular-sieve materials now produced in bead and pellet form can't be molded with retention of adsorbent characteristics (*CW, May 24, '58, p. 51*). For example, the 4A

type that is being molded for the refrigeration industry retains its moisture adsorbent ability (about 15:1 over silica gel), Linde says.

Molded into relatively simple shapes of various sizes, the molecular-sieve cores can be easily slipped into cartridge or other types of process-line filters and removed for purging in a furnace at 400-600 F. A few of the molded cores might replace bed-type molecular-sieve units in some applications.

And although the cores will probably cost more than twice as much on a weight basis as beads or pellets (exact price has not been set), they could eliminate the need for interconnecting piping with three- and four-way valves, control systems and equipment for circulating purge gas when bed-type units are used.

The cores also act as filters, can be used to trap solids 10 to 50 microns in size. Pressure drop is low: less than 2 psi. for the ½-in.-thick refrigeration cores. Breaking strength is high: over 50 lbs. for activated cores and 25 lbs. for hydrated cores used for refrigeration.

EQUIPMENT

Tote Bin-Blender: Tote System, Inc. (Beatrice, Neb.), is offering a new unit that enables blending en route of products being transferred in Tote Bins from one plant location to another. The lift-truck operator places the bin in the frame of a tumbler, which has an air cylinder that tilts the unit. The bin is then rotated on diagonal corners.

•

Flowmeter: Wallace & Tiernan Inc. (25 Main St., Belleville, N. J.) now has an improved version of the variable-area flowmeter (called Vareameter) for fluids. The meter's stainless-steel frame can be fitted with glass tubes ⅜ to 3 in. in diameter and 5 to 10 in. in scale length. A family of floats fits each tube size, has overlapping capacities in the 0.25- to 310-gpm. range for water, 1.1- to 1,300-cfm. range for air. The meters can be used at pressures to 350 psi. and temperatures to 400 F. Accuracy: ±2%. Metal-tube models will be available soon.

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Level Control: A submersible level control for automatic low-water cut-

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Write for Data Sheets or See
CHEMICAL MATERIALS CATALOG, Page 179

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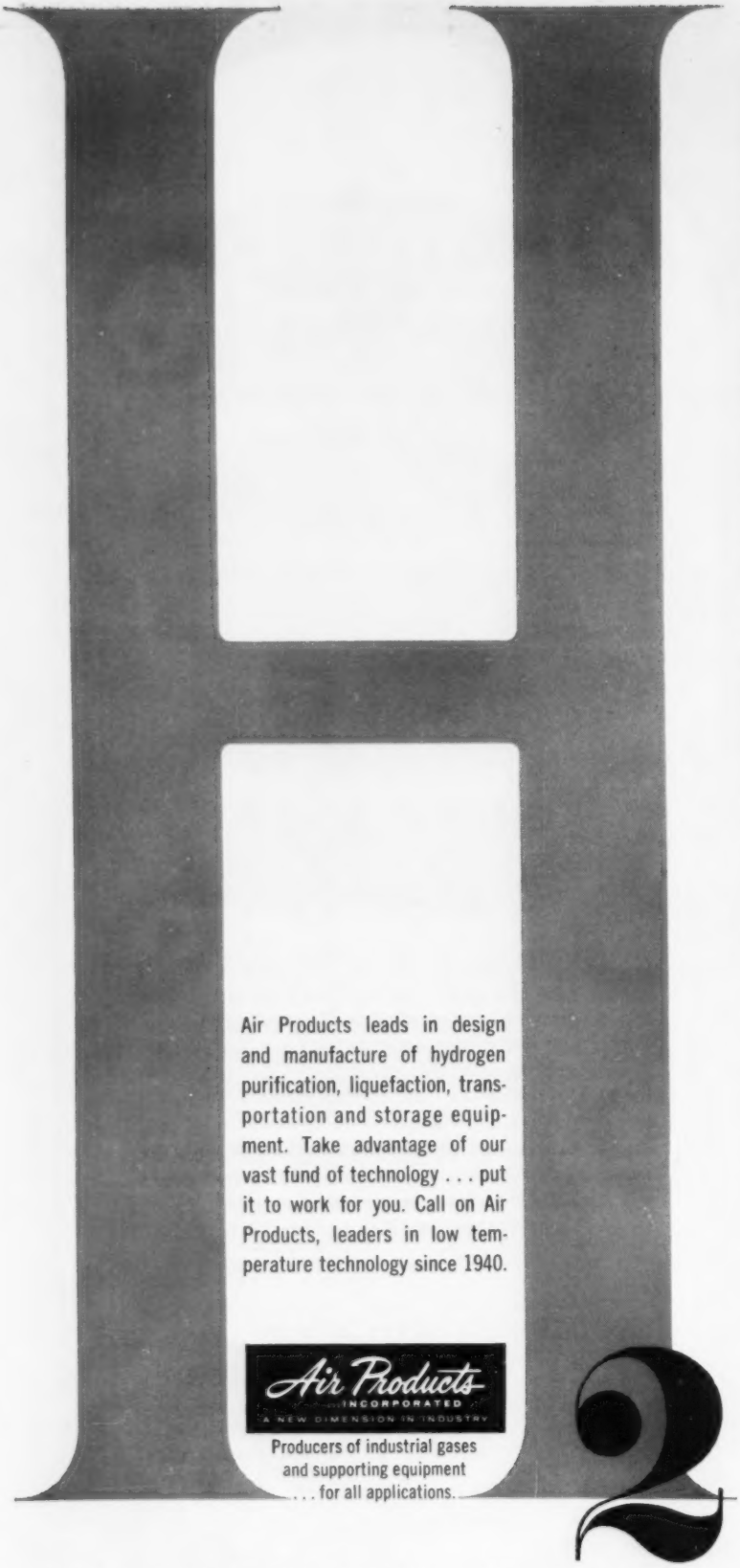
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off protection of submersible pumps and deep-well turbines is a new offering of B/W Controller Corp. (2200 East Maple Rd., Birmingham, Mich.). The control's electrodes are set just above the pump to prevent the pumping of air and sand. Electrodes are made of brass and stainless steel, insulated with vinyl.

•

Air-Gas Mixer: Eclipse Fuel Engineering Co.'s (Rockford, Ill.) new Minimixer produces an air-gas mixture that it delivers under pressure to an industrial-heating burner. The burner requires a blast pilot, but has no other air-pressure source. The fan-type mixer is less than 6½ in. in diameter, can be used for inputs up to 215,000 Btu./hour. The unit has an open-frame 1/25-hp. motor and an adjustable orifice for controlling gas input.

•

Toggle Valve: Republic Manufacturing Co. (15655 Brookpark Rd., Cleveland 35) has added a new line of toggle valves to its instrument component series. The valve is toggle-opening, spring-closing for fast on-off service and connection and disconnection. The valve, available in brass and stainless steel with nylon handles, is made in ⅛- and ¼-in. sizes for service to 200 psi. Temperature range: —65 to 160 F.

•

Liquid Loader: For efficient, economical loading and unloading of large quantities of liquids at new construction and other sites, OPW-Jordan (6013 Wiehe Rd., Cincinnati 13) offers its new portable loader. The unit, designed for use by the U.S. Army, is made of 2-in. bronze and aluminum, weighs 198 lbs.

•

Rotary Pump: The Deming Co. (Salem, O.) says its new rotary pump will handle materials that range from water-thin to asphalt-thick (viscosity of 80,000 SSU). The pump has only two moving parts, comes in sizes ⅜ to 8 in. for pressures to 200 psi. and capacities from 1.5 to 1,050 gpm.

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Welding Viewer: Singer Glove Manufacturing Co.'s Special Products Division (860 West Weed St., Chicago 22) is offering a new glass-welding plate for viewing through portable 6- and 8-ft. welding screens.

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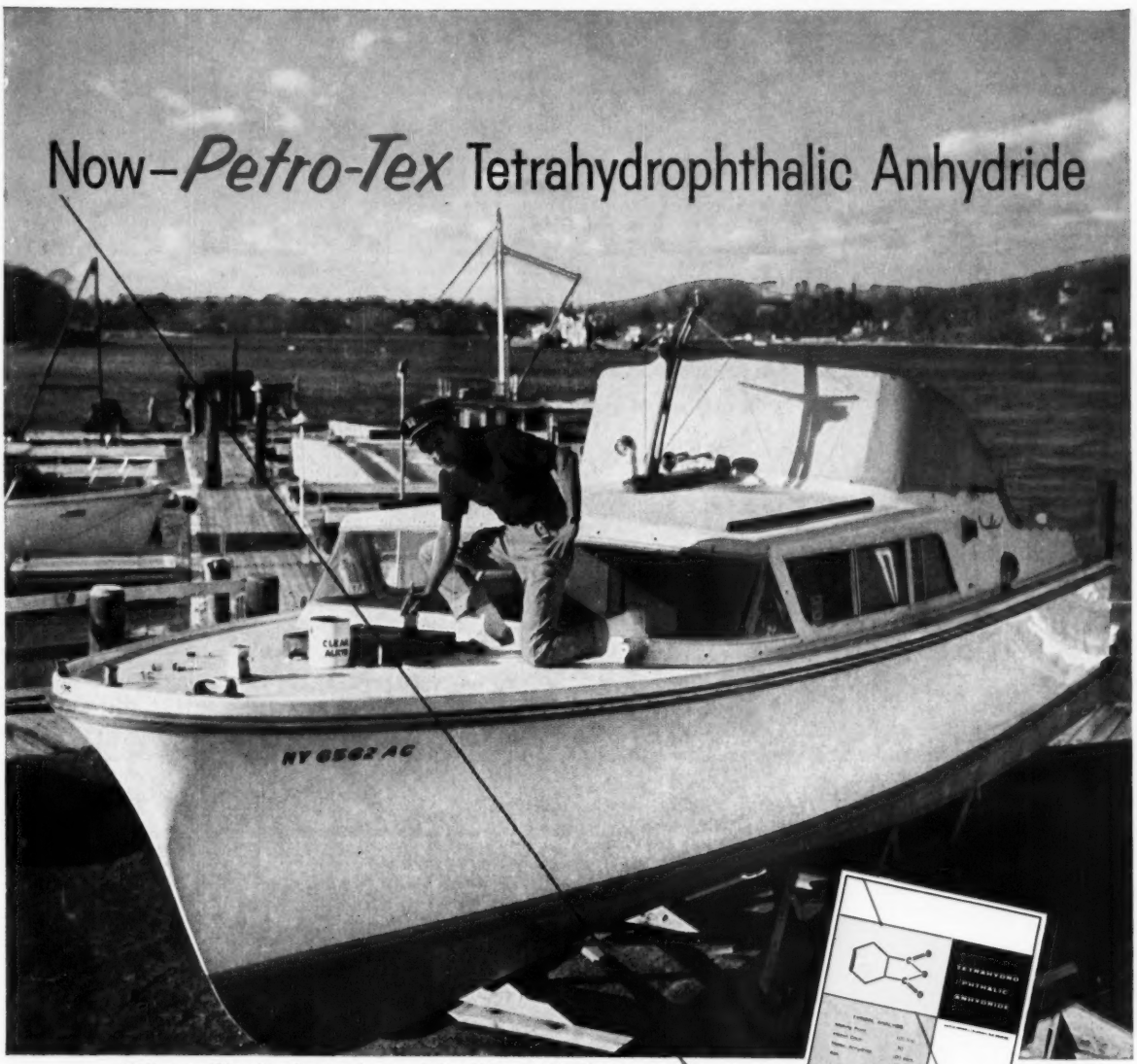

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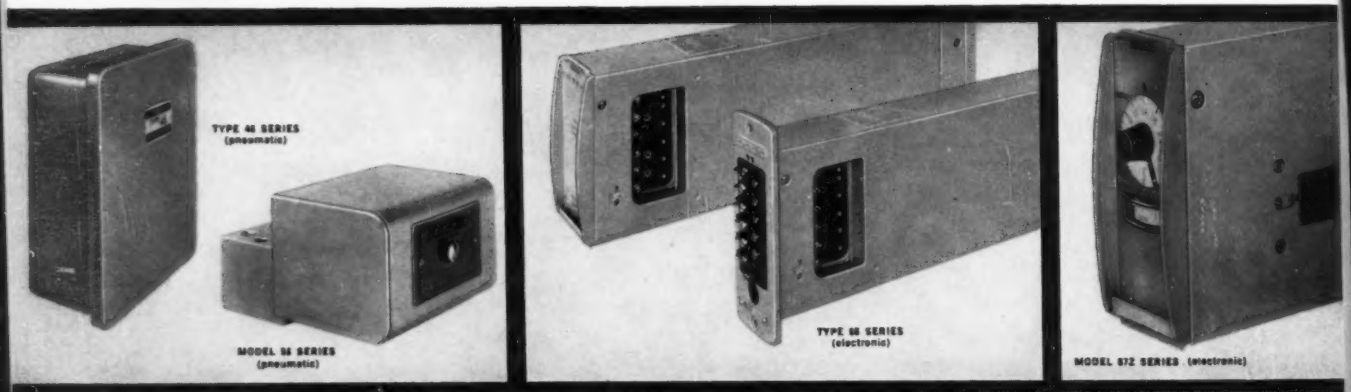

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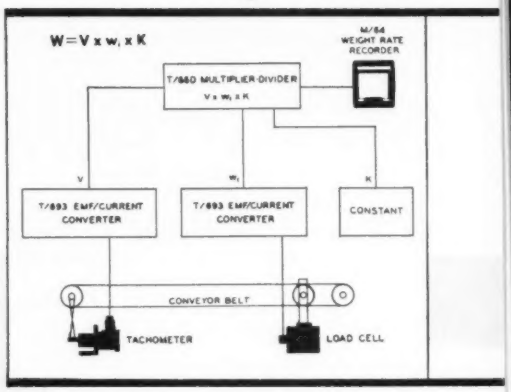

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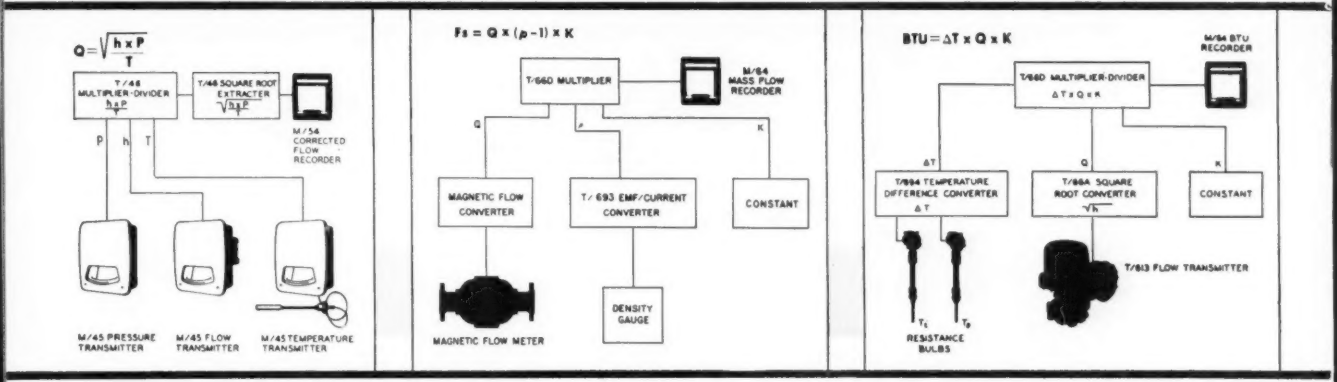

GAS FLOW COMPUTATION
In common use in the Gas Industry to compensate gas flow readings for changes in line temperature and static pressure. In the pneumatic system shown here, the Foxboro T/46 Multiplier-Divider and the Square Root Extractor allow operator to read corrected flow directly.

MASS FLOW COMPUTATION
Calculates dry weight of a slurry flowing through a pipeline. In this electronic system, flow rate and density measurement are multiplied together with a Foxboro T/66D-1 Multiplier. Operator can then read flow directly in Dry-Tons-Per-Minute.

BTU COMPUTATION
Determines actual amount of heat being introduced to, or removed from, a process. Electronic system shown uses a Foxboro T/66D Multiplier-Divider to produce a signal equal to product of flow and temperature difference. Operator reads directly in Btu's.

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THE ONE TO WATCH FOR NEW DEVELOPMENTS

Market Newsletter

CHEMICAL WEEK
May 13, 1961

What price too much benzene? The current and still firm 34¢/-gal. tank-car tag may well topple before summer's out.

Pressures building up to a softer schedule stem primarily from the industry's current petrobenzene capacity binge, and attempts by newcomers to stake out a spot in a soon-to-be-overcrowded field. When all planned units come in (before the end of '62), total U.S. benzene producing potential will be well over 815 million gal./year (*CW, Feb. 25,* p. *21*).

Significantly, estimated consumption this year may just top 500 million gal.

•

The imminent U.S. benzene excess, though worrisome, is not causing as much concern in the trade as is the sharp maneuvering for position now going on among the oil companies with aromatics aspirations. Fear is that the maneuvering could well wreck the market.

Bulk benzene consumers—even those already committed to suppliers—are being besieged with attractive (and competitive) offers from scrambling sellers, who, for the most part, are still months away from actual production. One such offer, reportedly being made by Atlantic Refining, would peg the price of its upcoming benzene (*CW Business Newsletter, April 29*) at 10% under today's quote, with a guaranteed bottom of 29¢/gal. The deal, say insiders, calls for a three-year contract.

(Atlantic, however, insists that its share of the 18-20-million gal./year benzene production from the jointly owned Pure Oil-Atlantic 50-million gal./year BTX plant at Nederland, Tex., has already been committed to captive use, and that it's entry into the field was based on a posting of 34¢ benzene.)

How would the industry react to a move that would reduce benzene prices 4-5¢/gal.? A *CW* spot-check among established producers indicates that even a threat of a cut (if concrete enough) would be met. And, adds one, "probably long before the initiator could be ready to start making deliveries."

The implication, of course, is that a rash move would carry no advantages.

Meanwhile, marketers are eyeing toluene's future in relation to the benzene situation. At the moment, the market is relatively unchanged, prices are steady at a posted 25½¢/gal. (delivered east of the Rockies). Reasons for the stability: sizable quantities of U.S. material are moving into export channels; use in benzene conversion units has made little dent as yet, in current supplies.

When Hydeal plants swing into production, toluene demand will begin to climb. This increase, petroleum observers believe, could lead to a hike in prices, which could put new Hydeal benzene producers in a cost/-price squeeze. Opposing views hold, however, that U.S. toluene output potential (from petroleum, tar distillers and coke ovens) is more than ample to satisfy all needs—and at tags no higher than those now in effect.

•

Impact of last week's softening of glycerin prices (*CW Market Newsletter, May 6*) is being felt by other chemicals. For example, Eastman Chemical Products is cutting 1¢/lb. off its triacetin, a glycern derivative. New schedules, retroactive to May 1, list the material at 35½¢/lb. in tank-car and tank-truck quantities; 38¢, c.l. or t.l. drums; and 39½¢/lb. for l.c.l. drums.

Pentaerythritol prices may be reduced because of the 2¼¢/lb. across-the-board drop in competitive glycerin. It would follow pattern. But this week major pentaerythritol producers tells *CW* they "have no plans" for countering the glycerin move.

A slash of nearly 30¢/lb. in 1,2,6-Hexantriol prices is Union Carbide's big strategy for broadening the compound's markets. Carbide says that the triol, aimed at glycerin-like outlets, is now commercially available from its South Charleston, W. Va., plant, where an "improved process" has increased the production potential. Included in the quotes is a new tank-car listing of 43¢/lb. C.l. and t.l. price is now 45.4¢/lb., down from 75¢, and l.c.l. quantities sell for 47¢/lb. vs. 75¾¢.

•

A rash of high-purity metals are going commercial. American Smelting & Refining has scaled up production of antimony, arsenic, bismuth, cadmium, gold, indium, selenium, silver and tellurium to "meet increasing industry demand." Until now, these Asarco products (99.999%-plus purity) have been available only in lab quantities.

•

A new herbicide plant that will "permit a 400% increase" in production capacity is now operating at the Baltimore, Md., works of Allied Chemical's General Chemical Division. Reason behind the hike: to meet an "expanded demand" in noncrop weed and brush control programs. Liquid and solid forms of General's Urox and Urab are being produced at the new installation.

•

Chemical Company sales in March were up $90 million—a gain of 3.7% over March '60. The new data, reports the U.S. Dept. of Commerce this week, show that sales of chemicals and allied products climbed to $2.52 billion in that month, bringing the first-quarter '61 total to about $6.87 billion. In comparison: last year's first three months' sales were only 0.6% higher.

CHEMICAL ENGINEERING SALES FILE /4
Re: Better Sales Analysis

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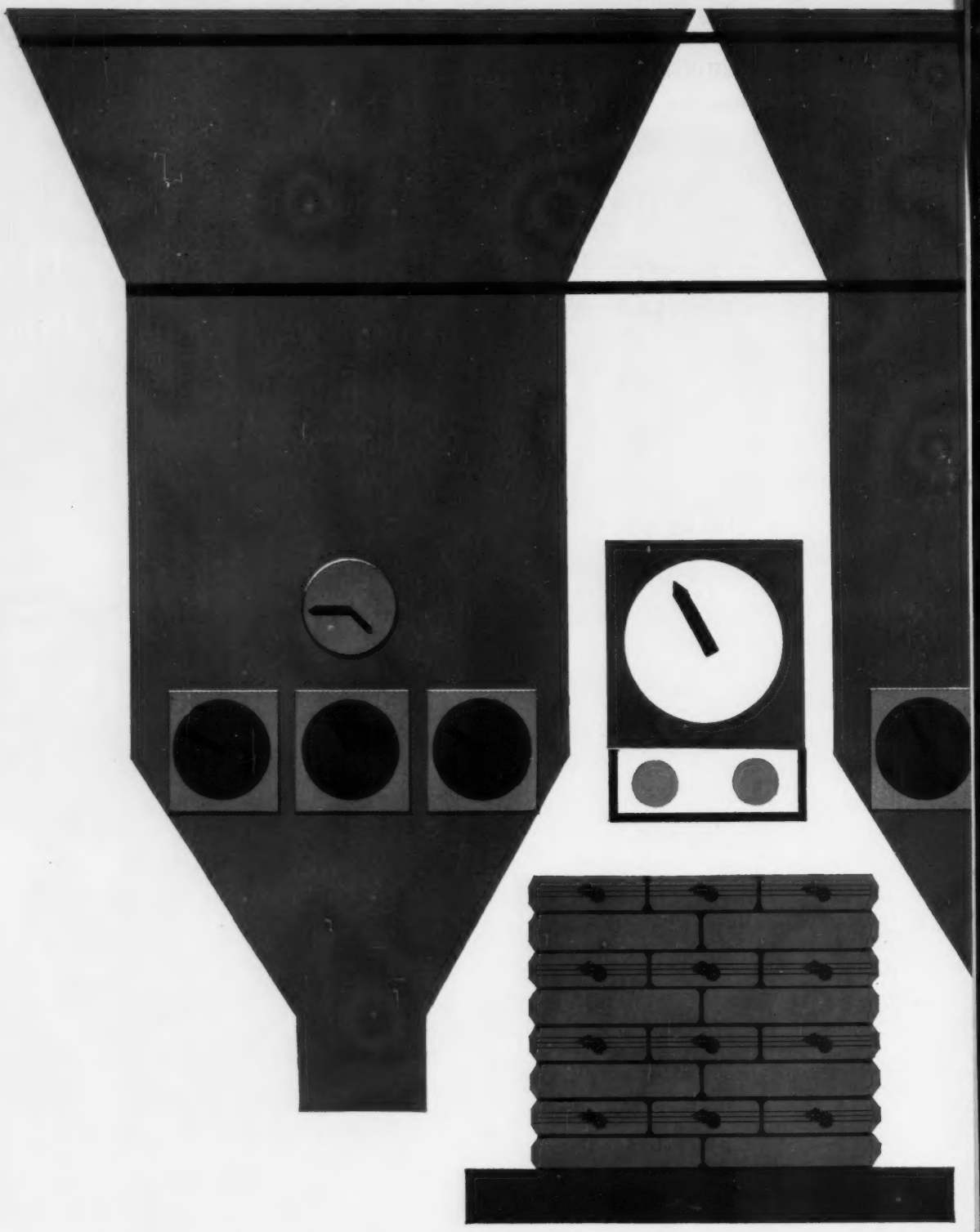

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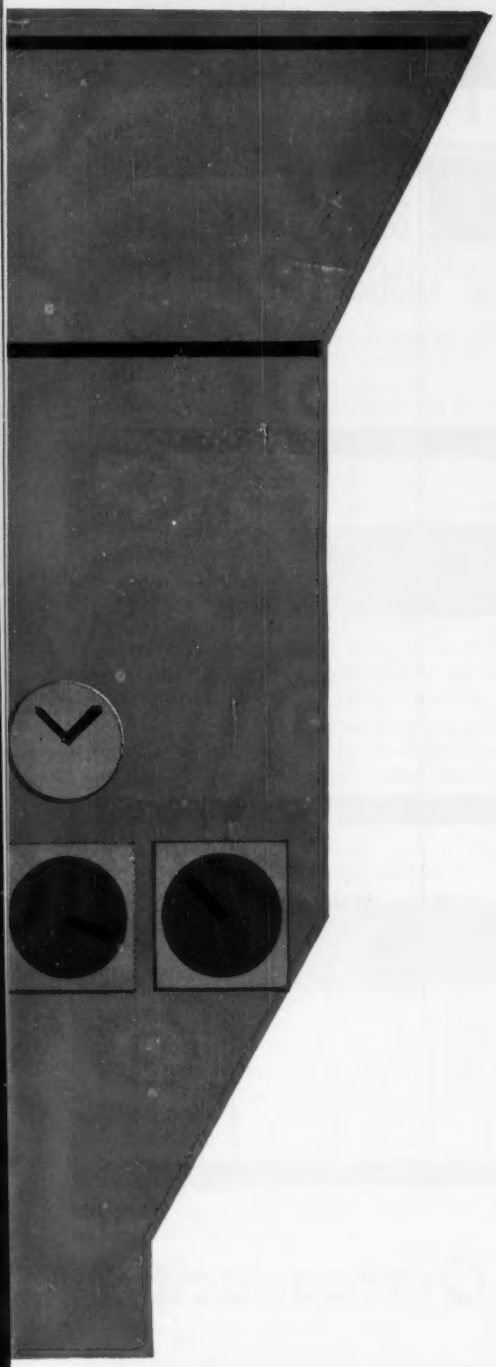

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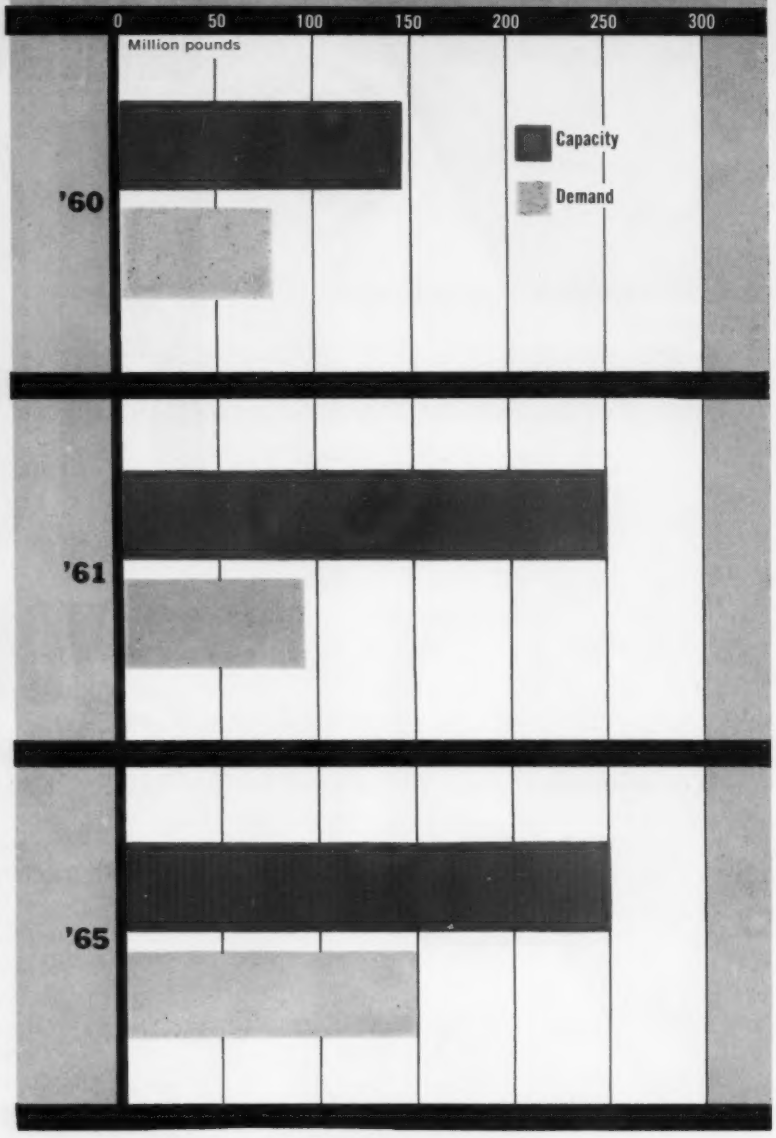
Maleic anhydride capacity far exceeded demand at year's end

And the imbalance will worsen by the end of '61

Outlook: demand will not catch up in foreseeable future



New Uses: Cure for Maleic Overcapacity?

This week Heyden Newport is placing onstream a new, 24-million-lbs./-year maleic anhydride plant at Fords, N.J.—the industry's third new maleic plant put into operation this year.

Although this new output potential is aggravating an already serious overcapacity situation (*see charts above*), maleic producers are optimistic about their business. Reason: they expect current uses of maleic to expand rapidly during the next five years. Moreover, a number of new uses—now in the development stage—are expected to lead to sizable new markets.

At the end of last year, capacity totaled 146 million lbs./year. Demand in '60 was only 78.5 million lbs.; however, it undoubtedly would have been higher if maleic had not been in temporary short supply during the first half of the year.

By the end of '61 capacity will reach 250 million lbs./year, with demand expected to climb to about 93 million lbs. for the year. Looking ahead, consumption in '65 is projected at only 150 million lbs./year, indicating a sizable oversupply situation for the next several years.

All producers of the chemical agree that a definite overcapacity problem exists in the industry today. However, maleic makers feel the overcapacity situation will persist for only a short time. They're banking on a pickup in conventional maleic markets, as well as development of a number of new uses, to brighten the demand picture.

Heyden Newport's general sales manager, Walter Deakyne, sums up the situation this way: "We agree that a maleic overcapacity is evident. But supply and demand should get into

THE LITHIUM REACTOR

CURRENT INFORMATION ON LITHIUM CHEMISTRY AND METALLURGY

LCA ANNOUNCES NEW, SAFE, EASY-TO-HANDLE "SOLID" N-BUTYLLITHIUM

In accordance with its policy of making lithium products easy to handle, as well as of highest purity and uniformity, LCA announces an important step forward in making *n*-butyllithium easier and safer to use. Formerly, this chemical was commercially available only in hydrocarbon solutions. Because such solutions are pyrophoric, they require special shipping and storage containers, and unusual precautions in use. Handling costs were correspondingly higher, and the special containers had to be returned, when shipped in quantity.

Now, LCA has developed and is currently producing *n*-butyllithium as a homogeneous suspension in a specially blended paraffin wax medium, for which patents have been applied for. So prepared, the product exhibits vastly improved handling qualities. *n*-Butyllithium in wax is non-pyrophoric and classified as a flammable solid, n.o.s. It exhibits good stability on moderate exposure to air, and offers much greater convenience and safety in storage, shipping and use.

Because of anticipated interest in the material, LCA will only accept orders for research quantities now. Commercial quantities will be available soon. Inquiries should be directed to the company's Sales Service Dept., 500 Fifth Avenue, N. Y.

Physical Characteristics

Initial commercial production of *n*-butyllithium in wax is being confined to cast sticks 5" long, 1" diameter, with either 20- or 30-weight per cent content of butyllithium. The 20-per cent concentration containing 0.15 lb of *n*-butyllithium is shipped in hermetically sealed disposable unpressurized cans. Cans of the 30-per cent product have 0.25 lb of *n*-butyllithium. Larger cast shapes are scheduled for early production. These will be two-pound trapezoidal ingots.

Stability

A 20-weight per cent product on exposure to air at 40°C and 100 per cent relative humidity for one hour showed no observable loss of active alkyl.

A 30-weight per cent product on exposure to air at 42°C and 100 per cent relative humidity for one hour showed a loss of 6.7 per cent of the original active alkyl.

Handling

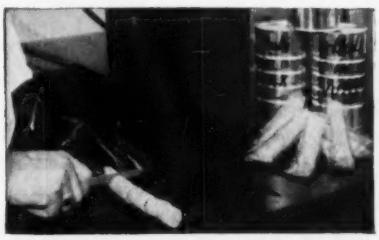
n-Butyllithium in wax may be handled and cut in air for reasonable periods of time such as two hours without significant loss of active alkyl. After use, containers of unused material should be filled with nitrogen or argon, and resealed.

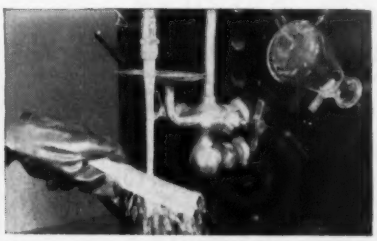
This product is non-pyrophoric and will not ignite even when immersed in water. It can be ignited with a flame, but the fire is slow-burning, and may be easily extinguished by exclusion of air, by smothering with dry lithium chloride, or with Ansul Dry Powder extinguisher. Although non-pyrophoric, it should be handled with rubber gloves.

Solubility

Since the wax must dissolve in the solvent being used as the reaction medium to free the active alkyl, the approximate solubility of the product in various solvents at room temperature is given:

(*continued in next column*)





LCA's new non-pyrophoric "solid" n-butyllithium not only may be cut or handled in open air for periods up to two hours, but may even be immersed in water without igniting.

Cyclohexane	21.4
Toluene	15
Hexane	13

wt. per cent

The solution rate is slow at 25°C, but increases 3 to 5 fold on warming to 40°C.

Applications

In general, this product, with its improved handling characteristics, may be used in practically all applications where *n*-butyllithium solutions in heptane (or other hydrocarbon solvents) are ordinarily employed.

LITHIUM IN BRIEF

New developments involving lithium are constantly appearing in the literature. Each month some will be mentioned here briefly.

Butyllithium reacts with α,α′,β,β′-tetrabromodiisobutyl ether in a transmetallation mechanism to give diisobutenyl ether, butyl bromide, and isobutenyl 3(2-methyl-2-heptenyl) ether. (4539)

o-Duroylphenyllithium, prepared from o-duroyl-bromobenzene and butyllithium, was condensed with benzaldehyde to give o-duroylphenylcarbinol. (4546)

In a study of the mechanism of the polymerization of acrylonitrile, butyllithium is listed as one of the agents which initiates true anionic polymerization. (4601)

Copolymers of acetone and dimethylketene were prepared using a butyllithium catalyst. (4700)

Styrene was polymerized, with halogen-free *n*-butyllithium as a catalyst, in benzene at −30°C or in *n*-heptane at −10°C, to a tactic polymer. Addition of butyl chloride, or the use of *sec*- or *tert*-butyllithium resulted in atactic polymers. (4356)

Butyllithium adds to vinyl-ethyl-acetylene to form $C_2H_5CLi{=}C{=}CHCH_2C_4H_9$, which on hydrolysis yields the corresponding allene. (4475)

Reaction of iodoferrocene with butyllithium gives ferrocenyllithium, which adds N_2O_4 in ethyl ether to form nitroferrocene. (4886)

For further information, write our Technical Service Department, Bessemer City, North Carolina.

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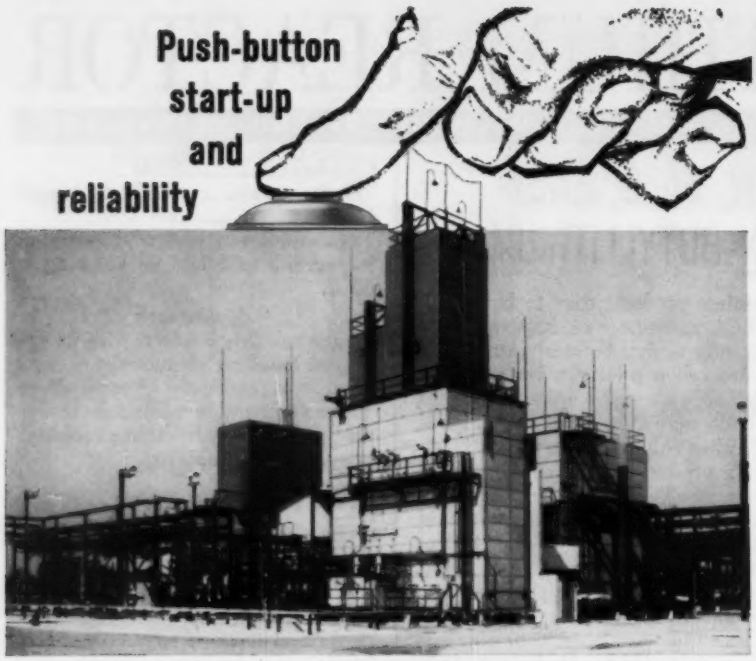

FULL CAPACITY IN 48 HOURS.

Push-button start-up — the ultimate aim of every plant engineer and designer — takes a lot of experience, particularly in the low-temperature separation field. Air Liquide has that experience: more than fifty years of designing and building all types of low-temperature separation plants.

Here is an example: a large high-purity oxygen plant (*above*) located in Texas. Designed and built by Air Liquide to produce close to 400T/D of 98% oxygen plus a stream of high-purity nitrogen, this plant was in full production *only 48 hours after completion of pressure testing.* Furthermore, extreme flexibility of operation was proved during acceptance tests with completely satisfactory operation over all its designed range, with oxygen purity up to 99.6% and nitrogen purity of less than 100 ppm.

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✱ **ALL AIR LIQUIDE LOW-TEMPERATURE PLANTS ARE DESIGNED AND BUILT IN NORTH AMERICA FROM NORTH AMERICAN MATERIALS — TO NORTH AMERICAN STANDARDS**

Maleic Anhydride Producers and Capacities

(million pounds/year)

	Dec. '60 (est.)	Dec. '61 (est.)
Allied Chemical Moundsville, W.Va.	20	20
Buffalo, N.Y.	20	20
American Cyanamid Bridgeville, Pa.	20	20
Heyden Newport Fords, N.J.	—	24
Monsanto Chemical St. Louis, Mo.	60	60
Pittsburgh Chemical Neville Is., Pa.	—	20
Petro-Tex Houston, Tex.	—	30
Reichhold Chemicals Elizabeth, N.J.	26	26
California Chemical Richmond, Calif.	—	20
Totals	**146**	**240**

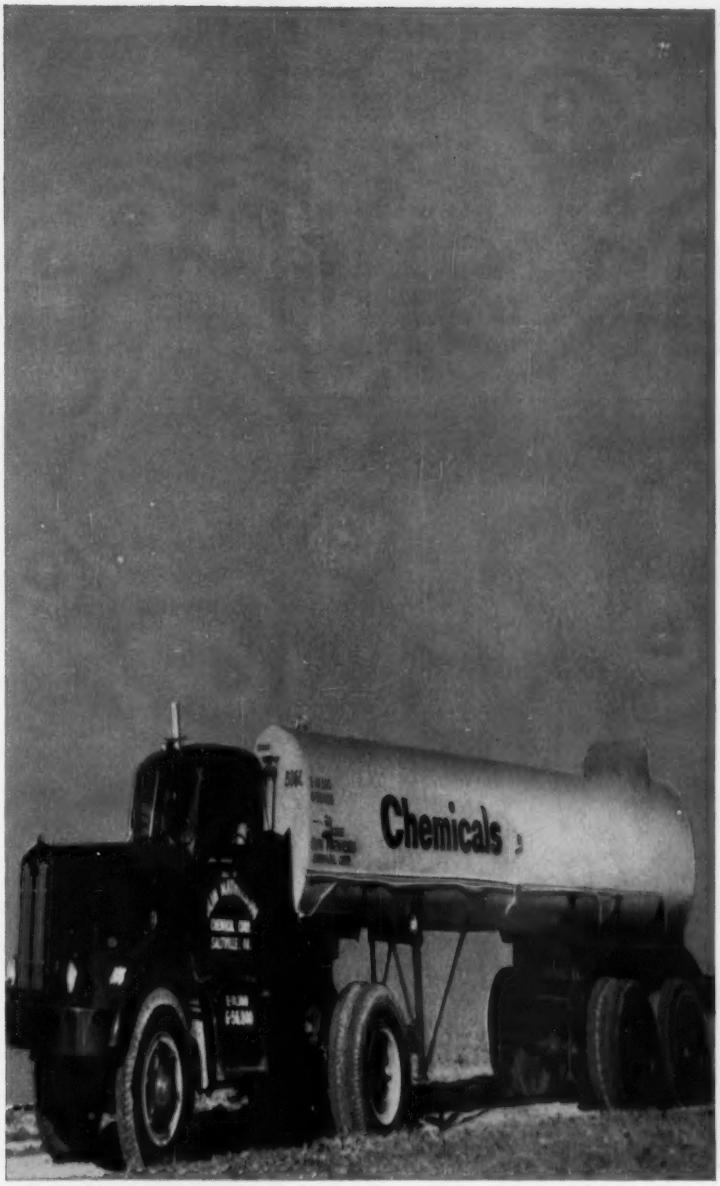
balance in the not too distant future. It could happen as early as '63. Both present uses, as well as new applications that are under development should rapidly swell maleic demand during the next five years."

In commenting on Heyden Newport's position today, Deakyne says: "We feel that Heyden Newport's position in the market is sound . . . by virtue of our marketing position . . . as well as the current prospects for developing sizable captive requirements within the company."

Petro-Tex's president, Sidney Ellis, declares: "We expect maleic anhydride to be fully supplied for the short-term future. But the market for this chemical will expand rapidly during the next several years . . . largely because of the active research now under way. We feel that Petro-Tex's unique process based on low-cost feedstocks puts us in a good competitive situation."

Pricing Policy: None of the companies interviewed expect a maleic price cut in the immediate future, although one did concede that there will be some downward pressure on prices because of the current overcapacity dilemma.

Some observers believe, however, that prices can be expected to tumble, although maleic producers will resist



Mathieson SQUEEZES your caustic delivery costs

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Convenient truck scheduling: we time deliveries when you need them. Service: as you have a right to expect, it's part of company policy, backing every Mathieson chemical with technical assistance. For full details, write OLIN MATHIESON, Baltimore 3, Maryland.

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CHEMICALS DIVISION Olin

ideas and news:

Up to 35 square feet of screening area in only 16 square feet of floor space: Stacked-deck design of this gyratory screen conserves valuable space. Cuts maintenance, downtime with all-stainless-steel construction. Abrasive or corrosive materials, dry foods and pharmaceuticals are handled with care. Gentle, quiet, vibrationless operation means minimum disintegration of fragile particles.

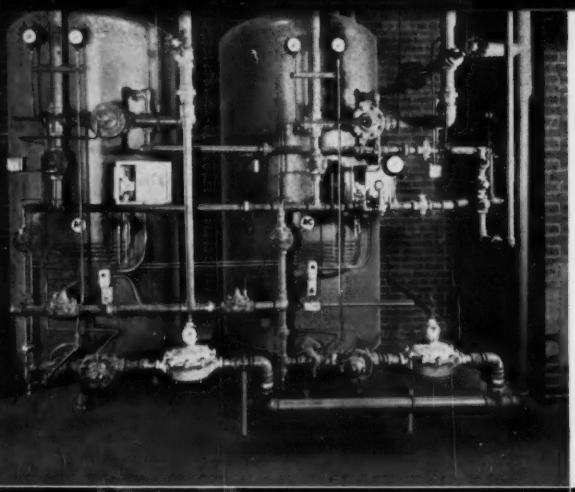
Silicon rectifiers can be located anywhere in the plant. Designed especially for large electrochemical or industrial applications where space, heat or dirty atmospheres are a problem, these silicon rectifiers employ water-to-water heat exchanger equipment. No special room is required — no need for clean air for cooling. Smaller compartment sizes save floor space. Cells can be removed without disturbing the cooling system. Reactor cores eliminate need for matched cells, surge capacitors protect against voltage surges, and current-limiting fuses provide cell protection.

Which of these productive ideas could be working for you?

A continuous mechanical agglomeration process that makes waste materials pay. A steam turbine-generator with dual-purpose flexibility. A gyratory screen that saves space. These examples demonstrate the extra value that is standard with Allis-Chalmers . . . the greater efficiency and the added productivity which are yours when you buy A-C products, systems and services. Call your Allis-Chalmers representative for details on A-C "worth-more" features. Or write Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.

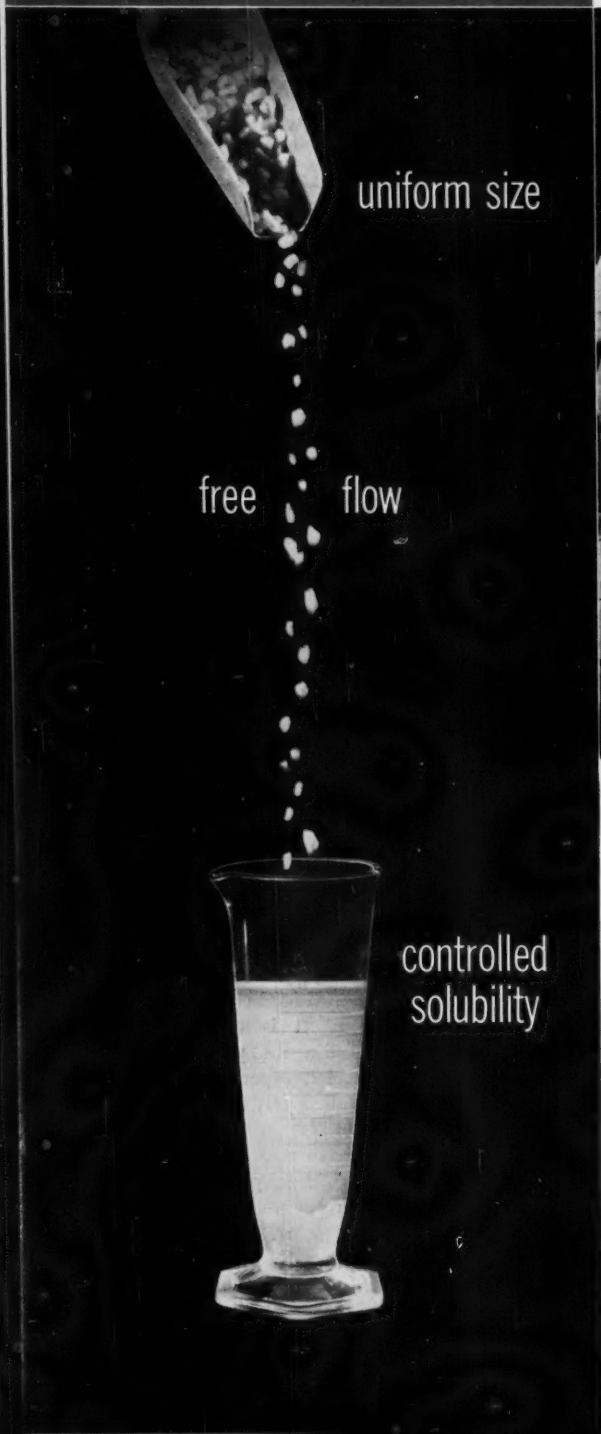
Compactor is an Allis-Chalmers trademark.

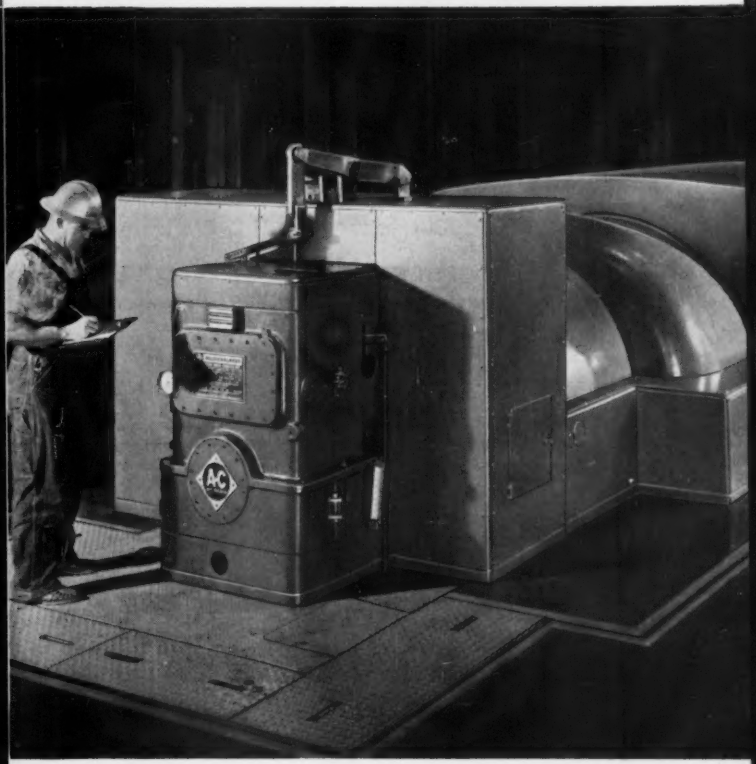
A-1480



Calcium and magnesium are the "vandals" that cause scale in pipes and boilers, clog systems and mean heavy use of cleaning compounds. ZEOLITE is their natural enemy! An A-C zeolite water softener means a simple switch to sodium ions from the usual hardness present in most water supplies. Once A-C conditioned, the "softened" water finds ready use in chemical plants to end scaling problems.

Even the by-product makes an economy contribution: Versatile . . . describes these two 6250-kw condensing, automatic extraction steam turbine-generator units installed in a midwest petrochemical plant. A typical application supplying steam to a process with electric power as an economical by-product. A-C manufactures a complete line of condensing and non-condensing turbine-generator units, with or without automatic extraction, for the chemical industry. For complete information on types and ratings from 2000 kw to the largest, ask for bulletins 7654A and 9448.





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Maleic Anhydride End-Use Breakdown

(million pounds/year)

	'60	'65
Polyesters	32	65
Surface coatings	19	25
Ag chemicals	8	15
Detergents	4	6
Paper size	4	7
Fumaric acid	2.5	8
Export	5	3
Miscellaneous*	4	20
Totals	78.5	149

*Includes new uses under development.

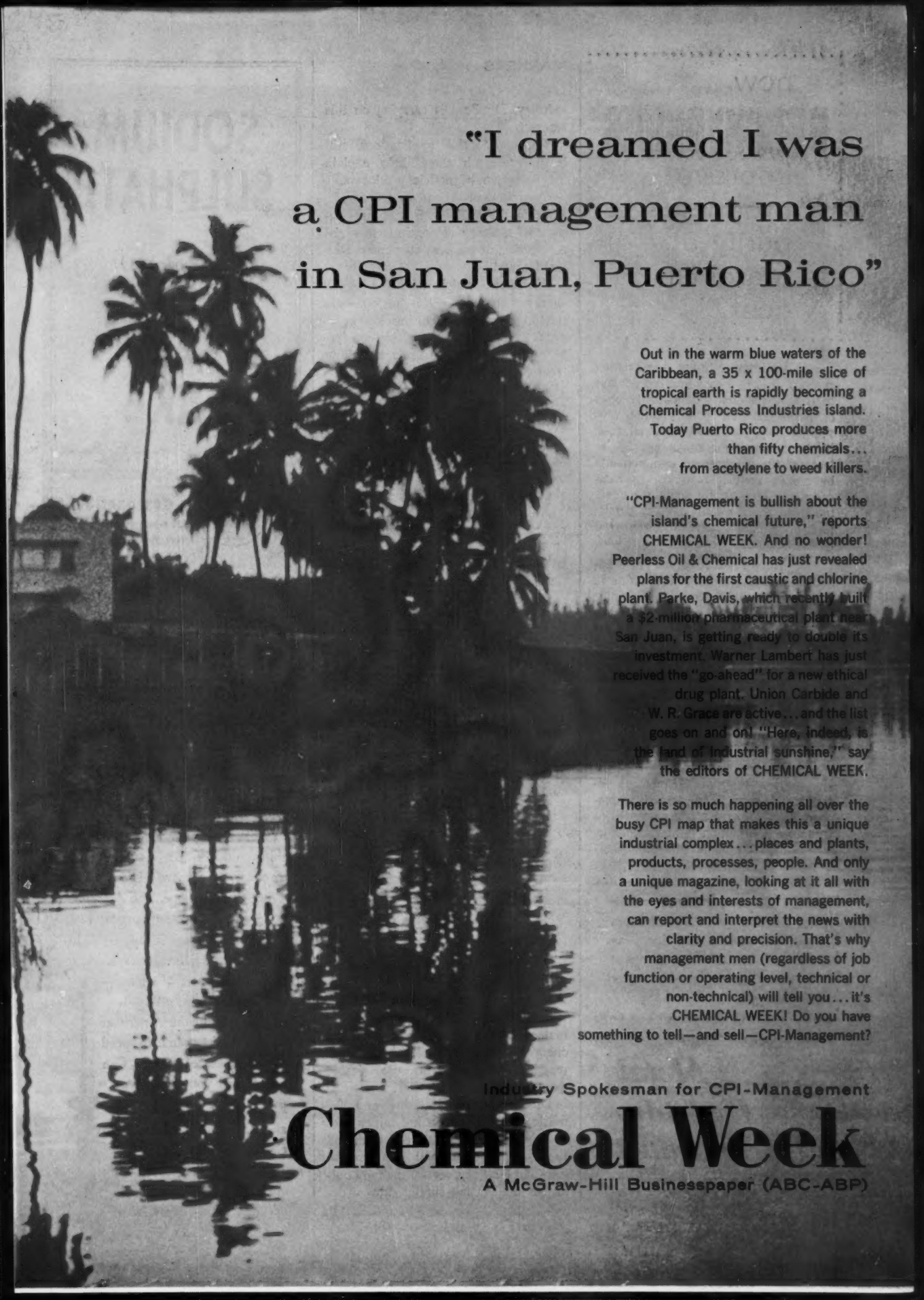
a price slash. Of course, if a lower price would open up substantial new markets, maleic producers would undoubtedly reconsider their pricing philosophy. But at the present time there are no indications that such a move is likely.

Accent on Research: Meanwhile, maleic producers and consumers are both busily researching promising new outlets, including rubber, plastics, adhesives, textiles, leather. If they prove out, maleic consumption is bound to take a sizable jump.

Use of maleic anhydride in rubber is held to be one of the most promising new applications. Maleic anhydride reacts with isoprene and butadiene to form polymers that are said to have a variety of uses, including tire manufacture. Shell and Goodyear are believed to be among those interested in this field.

And styrene and maleic anhydride react to form a polymer that has good potential in several applications such as latex paint modifiers, floor polishes, hair sprays and others. Both Monsanto and Texas Butadiene are offering these polymeric materials for evaluation. TB&C is bullish about the future. It is currently operating a 1-million-lbs./year plant in Miami, Fla., but expects to construct a 15-million-lbs./year facility by the end of next year.

Among other areas of potential interest: maleic anhydride and the isocyanates react to form a kind of synthetic leather. According to observers, the synthetic material could offer serious competition to the leather



"I dreamed I was a CPI management man in San Juan, Puerto Rico"

Out in the warm blue waters of the Caribbean, a 35 x 100-mile slice of tropical earth is rapidly becoming a Chemical Process Industries island. Today Puerto Rico produces more than fifty chemicals... from acetylene to weed killers.

"CPI-Management is bullish about the island's chemical future," reports CHEMICAL WEEK. And no wonder! Peerless Oil & Chemical has just revealed plans for the first caustic and chlorine plant. Parke, Davis, which recently built a $2-million pharmaceutical plant near San Juan, is getting ready to double its investment. Warner Lambert has just received the "go-ahead" for a new ethical drug plant. Union Carbide and W. R. Grace are active... and the list goes on and on! "Here, indeed, is the land of industrial sunshine," say the editors of CHEMICAL WEEK.

There is so much happening all over the busy CPI map that makes this a unique industrial complex... places and plants, products, processes, people. And only a unique magazine, looking at it all with the eyes and interests of management, can report and interpret the news with clarity and precision. That's why management men (regardless of job function or operating level, technical or non-technical) will tell you... it's CHEMICAL WEEK! Do you have something to tell—and sell—CPI-Management?

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New Low Prices: As quantity production of sodium borohydride rolls into high gear, prices have dropped significantly. Current prices for annual contract quantities, in fact, are lowest in the product's history.

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industry. Du Pont is carrying on this research.

These and other applications, still in the research stage, help explain the optimism of maleic producers.

Conventional Uses to Climb: In addition the various present applications of maleic will continue to register significant gains as consumers step up demand.

Polyesters, which take the major share of maleic—40% in '60—will remain top outlet. During '60 polyesters consumed about 32 million lbs. of maleic anhydride, three times the level of five years ago.

And consumption of polyesters in reinforced plastics will boost maleic's growth. Demand for reinforced plastics hit 250 million lbs. in '60—two and a half times the '55 level of 100 million lbs. By '65, demand will be about 475 million lbs./year.

Although maleic anhydride has competition in this application, it's unlikely that its dominant position will be impaired. By '65 demand for maleic in polyester production should reach 65 million lbs.

Surface coatings are also a sizable consumer of maleic anhydride. Alkyds take the bulk of this total, the remainder goes to drying oils, plasticizers and polyesters for coatings. Surface coatings should use at least 25 million lbs. of maleic anhydride by '65.

Plasticizers, such as dibutyl maleate, used in polyvinyl acetate emulsion coatings, and new resins, such as the styrene-maleic type, will help support maleic's growth curve.

Other current uses for maleic include agricultural chemicals, paper sizing, detergents and fumaric acid manufacture. Agricultural chemicals such as insecticides and plant growth regulators appear to offer the most promise. In '60, ag chemicals consumed about 8 million lbs. of maleic anhydride and by '65 consumption should grow to about 15 million lbs./year. Malathion is the largest maleic consumer in the agricultural chemicals category but, Captan and maleic hydrazide also use sizable quantities (*see also p. 28*).

Detergents, paper sizing and fumaric acid production are minor uses in comparison. However, each of these applications will continue to grow. In fact, exports are the only outlet for maleic that should show a de-

SODIUM SULPHATE

(Anhydrous)

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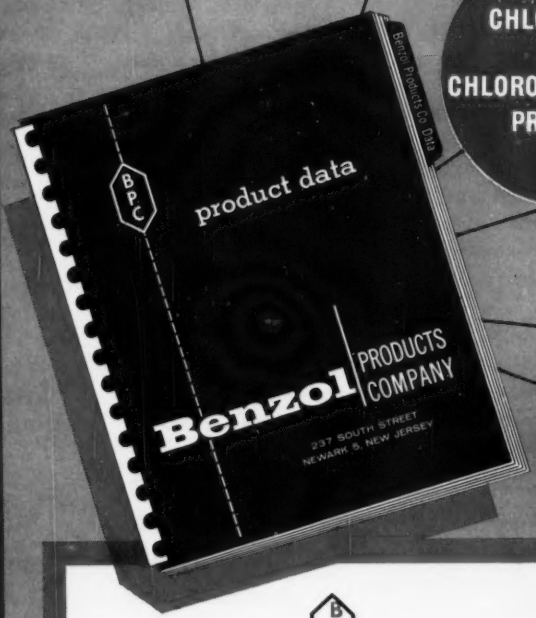

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Chemical Week
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crease by '65. The considerable build-up of maleic plants overseas is the reason behind the expected decline.

Outlook: As the U.S. economy moves back into high gear, the near-term maleic market should likewise show good improvement. And by '65, demand is expected to reach at least 150 million lbs./year. It could be much higher, depending upon how rapidly new uses move from the research stage to commercialization.

On the other hand, with current capacity at 250 million lbs./year, the overcapacity problem will continue to plague producers over the short term. This condition will exert a downward pressure on prices until new uses come along to correct the imbalance.

Elastomer Output Up

Production of synthetic elastomers hit a record high in '60—but sales declined during the same year—according to statistics just released by the Tariff Commission.

Output of all types of elastomers reached 2,952 million lbs. in '60, 4.5% increase over '59's production of 2,825 million. Both the cyclic and acyclic elastomers registered gains during the year.

Production of cyclic elastomers, primarily butadiene-styrene (S-type), rose to 2,283 million lbs. in '60, compared with production of 2,213 million lbs. in '59. Sales of the cyclic polymers slumped to 1,949 million lbs. in '60 from the level of 2,006 million lbs. in '59.

Growth of the acyclic elastomers was more pronounced. Production last year gained 9.1% and reached 669 million lbs. in '60 as sales rose to 602 million lbs.

The acyclic elastomers should continue to support the synthetic rubber growth curve in the years ahead as these materials find new markets. The most significant development in this area is synthetic natural rubber (polyisoprene and *cis*-1,4, polybutadiene), which by '65 will account for almost a doubling of acyclic elastomer production over '60 levels.

Meanwhile output of the cyclic elastomers is expected to continue to register gains in the years ahead. Production of urethane elastomers during '60 totaled about 6.8 million lbs.

Tracers

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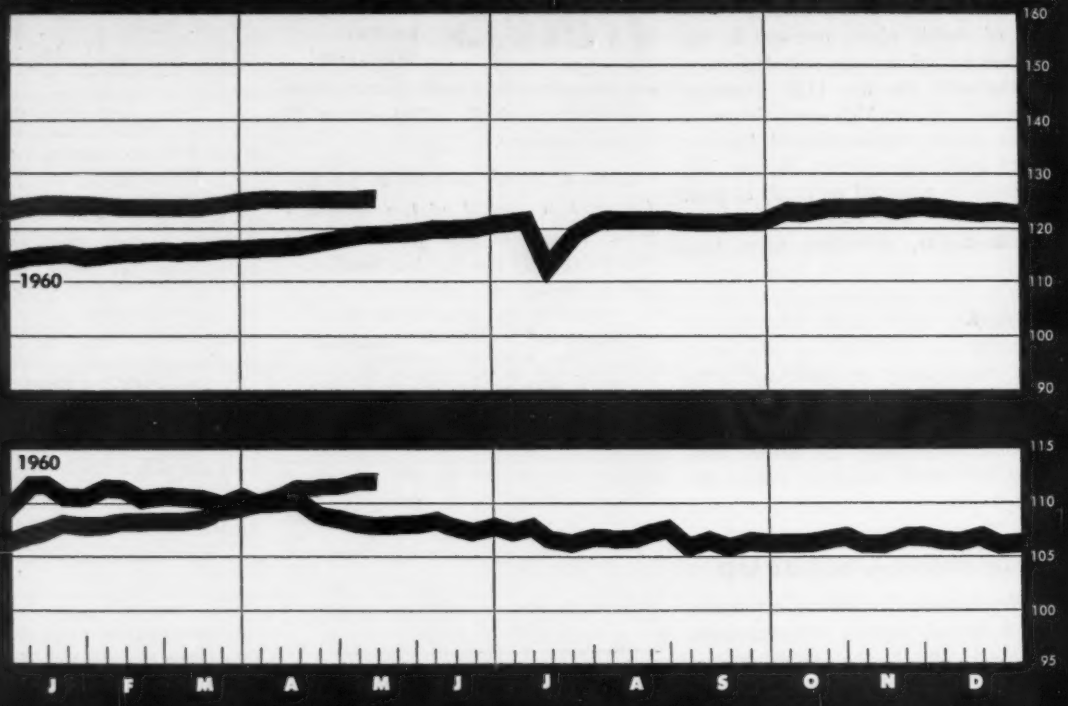
BUSINESS BENCHMARKS



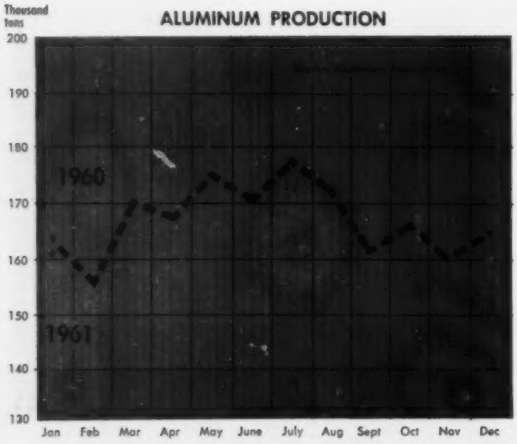
MAY 13, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	126.5	126.5	120.8
Chemical Week wholesale price index (1947=100)	113.2	113.1	108.8
Stock price index (11 firms, Standard & Poor's)	51.17	50.67	50.57
Steel ingot output (thousand tons)	1,858	1,784	2,210
Electric power (million kilowatt-hours)	14,294	14,311	13,656
Crude oil and condensate (daily av., thousand bbls.)	7,249	7,244	7,014

WHOLESALE PRICE INDICATORS (1947-49=100)	Latest Month	Preceding Month	Year Ago
All commodities (other than farm and foods)	128.1	128.0	128.6
Chemicals and allied products	110.6	110.4	110.1
Industrial chemicals	123.4	123.3	124.2
Paint and paint materials	122.2	122.1	119.0
Drugs, pharmaceuticals and cosmetics	94.7	94.6	94.2
Fats and oils (inedible)	56.5	54.3	50.6
Fertilizer and materials	112.0	112.1	110.1

CHEMICAL CUSTOMERS CLOSE UP

ALUMINUM PRODUCTION



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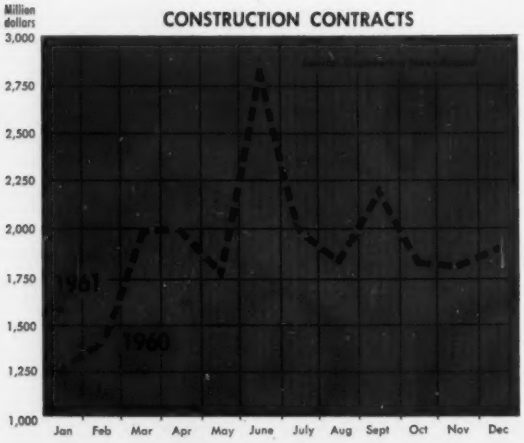

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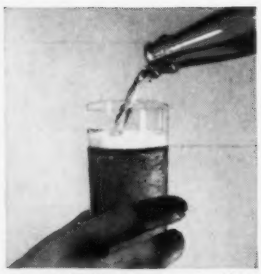

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